

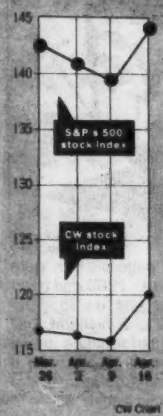
COMPUTERWORLD

\$2/COPY; \$44/YEAR

APRIL 21, 1986

VOL. XX, NO. 16

Stock update



Stock charts in full, page 141

Product Spotlight

Page printers:
Lifting the
limits on
printing/45

In Depth
Graphics as
a strategic
weapon/67

TOP OF THE NEWS

Management Science America, Inc.'s Information Expert earns rave reviews but little revenue. **Page 15.**

The IRS lacks an adequate disaster recovery plan and risks prolonged systems disruptions, a GAO study says. **Page 13.**

A switching system program's logic error causes a phone company to underbill customers by \$35 million. **Page 41.**

Communications managers search for more management tools to operate multi-vendor systems. **Page 31.**

Users struggle to manage increasing amounts of computer-aided design and manufacturing data. **Page 2.**

IBM's 8100 will not be functionally enhanced in the future, but the DPPX operating system may be moved over to 370-based systems. **Page 6.**

Wang Laboratories introduces a voice and data system using telephone equipment from Telenova, Inc. **Page 12.**

DEC last week reported sharply higher earnings for its third fiscal quarter ended March 29. Profits skyrocketed 86% to \$170.3 million from \$91.7 million a year ago, while per-share earnings jumped from 76 cents to \$1.32. The jump came on just a 14% gain in revenue, from \$1.69 billion to \$1.93 billion. Vice-President and Chief Financial Officer James M. Osterhoff said new product sales and continued cost controls returned DEC to double-digit operating margins. Many other companies reported quarterly results last week, including Wang and Honeywell. **Page 142.**

IBM last week apparently won the two-year-long race against several Japanese vendors to install 1M-bit memory chips in its 3090 mainframes. At the same time, IBM advanced delivery of those mainframes by one to four months. **See NEWS page 4**

AI tool seeks wider market

Application delivery focus of low-end Symbolics unit

By Eric Bender

NEW YORK — Symbolics, Inc., which launched the market for dedicated symbolic-processing machines in the early 1980s, last week took another major step aimed at commercializing artificial intelligence technology by introducing its first system designed for end users rather than software developers.

Priced at least one-third below previous Symbolics models, the 3601AE applications delivery system is designed to increase the cost-effectiveness of running artificial intelligence-based packages, President Russell Noftsker said.

See AI page 4

IBM hooks Token-Ring to 370 hosts

By Douglas Barney

IBM last week moved to fill several critical gaps in its Token-Ring network introduced last fall. The company announced products to provide connections between networked Personal Computers and 370-family mainframes, System/36 minicomputers and Series/1 processors.

"The local-area network announcements today fill a number of holes," said Robert F. Steen, systems manager, network systems, for IBM's Communication Products Division. "The first is the lack of direct connection to the mainframe." Many of the products will not be available until 1987, however.

Reaction was positive at one large corporation that has already invested in Token-Ring. **See IBM page 8**

Tandem boosts Nonstop line

By Jeffrey Beeler and David Bright

CUPERTINO, Calif. — Capping a five-year proprietary chip development effort, Tandem Computers, Inc. last week introduced a mainframe-class transaction processing system that reportedly boasts twice the throughput of the firm's largest existing processor.

According to Tandem President Jim Treybig, the latest addition to the company's line rivals, in its maximum configuration, the computing speed of IBM's 3090. Such performance levels are crucial to the new system's target market, users cluster. **See TANDEM page 10**

Ford tying PC Network to factory automation

By Peggy Watt

DETROIT — Ford Motor Co. is working with IBM to develop and install a continent-wide broadband network linked with internal local-area networks at 26 Ford assembly plants throughout North America.

At least 100 IBM Personal Computers will be installed at each plant, beginning with the assembly plant in Wayne, Mich. Work on the Wayne plant system began last week.

Ford's IBM network will provide plant foremen with the usual electronic mail and file-sharing capabilities of a local-area network, plus gateways to Ford's mainframes and ASCII asynchronous access to on-site minicomputers. The ASCII gateway, being developed by IBM. **See FORD page 9**

CW EXCLUSIVE

Publish or perish: Start-up grabs early page language lead

By Peggy Watt

PALO ALTO, Calif. — The unsung hero of the desktop publishing phenomenon is a 44-year-old company founded in 1982 whose Silicon Valley offices have recently welcomed a stream of negotiators from better known high-tech firms.

The company is Adobe Systems, Inc., and two years ago, its sole product, the page description language Postscript, was picked by Apple Computer, Inc. as the composition language for Apple's Laserwriter printer.

Since Apple introduced the Laserwriter in 1985, Postscript drivers have been implemented on all four of the standard engines used in the majority of the

200 or so laser printer models on the market (see Product Spotlight, page 45). The only major holdouts are Hewlett-Packard Co. and IBM, which both use proprietary page command languages in their printers.

Adobe has covered ground rapidly for a young company; it was founded by two former Xerox Palo Alto Research Center scientists who originally helped develop Xerox's Interpress language. Both founders remain active: John Warnock is a president who likes to experiment with the latest applications, and Charles Geschke, executive vice-president, still works in development.

Warnock says he believes Postscript will not only become a standard for desktop publishing but will help unify the larger electronic publishing industry by branching to typesetters and dedicated systems.

"Typesetting firms that aren't paying attention to this are going to be in trouble," he says.

Printing jobs usually contracted out or sent to the in-house print shop are slowly moving inside individual departments that can produce publications or documents with a microcomputer

and laser printer.

Some typesetting systems will **See START-UP page 14**



Warnock

***** S-DIGIT 48106
V
CJ0179526-0
JOYCE BROWN
UNIV MICROFILMS INTERNATL
300 N ZEEB RD
ANN ARBOR MI 48106

NEWSPAPER

NEWS

Users ponder CAD/CAM data base management woes

Conference features no clear solution to growth of data

By Rosemary Hamilton

FRAMINGHAM, Mass. — Computer-aided design and manufacturing (CAD/CAM) professionals are struggling to find ways to manage increasing amounts of data and are finding no clear direction emerging.

A two-day conference sponsored by "CAD/CIM Alert," a publication from Management Roundtable, Inc. in Chestnut Hill, Mass., was held last week to address the problem. Many issues were raised, but no firm answers were provided. There were 20 data management methods presented by users and vendors alike. Each had its own twist, and most were only partial solutions.

E. F. Codd, the designer of the original relational data base model who has sparked debates in the DP/MIS community with his controversial theorems, could not even capture his audience's attention, much less stir up a heated discussion. Perhaps it was because Codd was the last in a long line of presenters trying to sell their ideas. Codd warned his listeners, "If you develop a CAD/CAM system, it had better be, for your sake, on a relational foundation," but his concepts of predicate logic and integrity constraints seemed lost on the group, which was predominantly composed of engineers.

Nonetheless, Peter Marks, a vice-president of Automation Technology Products, who spoke at and coordinated the CAD/CAM Databases '86 — Control for the Decade Ahead Conference, said he was pleased with the conference. Acknowledging that there are no solid answers today, he said the fact that more vendors are now involved — 13 vendors discussed their data management capabilities as opposed to three last year — shows that this area is finally gaining attention and is at least on the road to finding solutions.

CAD/CAM data management has a wealth of problems associated with it. Some are typical data management problems, while others are exclusive to the field.

For starters, many CAD/CAM environments have the common problem of linking multivendor systems. As a result, a central data base that all systems can access is not easy to find on the market and is difficult to develop in-house. Said Robert Glasier, a product marketing manager at Intergraph Corp., "No one is walking into this with a clean slate. We all have to think of interfaces."

Beyond that, a centralized data base for a corporation's CAD/CAM department is barely economically or technologically feasible, especially for large organizations. According to Marks, the amount of information required to build a commercial aircraft

is estimated at one million gigabytes. To store all this information on a system, a user would need two million 500M-byte disk drives, Marks said.

There was disagreement among the vendors at the conference as to how one would store data. Some vendors, such as Intergraph Corp., offer a system that maintains graphical data in one data base and text data relating to the graphical information in a separate data base. Other vendors, such as Computervision Corp. and Digital Equipment Corp., maintained that "data is data" and can be stored in one data base.

Still another option was presented by Hewlett-Packard Co. Pat Adiamak, technical DBMS product manager, said that data bases alone are not the issue. "In terms of managing data, it's often on multiple vendors' systems, and a lot of the data is still on paper. A solution would be a centralized directory that tracks where all the data resides."

Because the issues have yet to be sorted out, vendors are currently "not supplying solutions for all our needs," Marks said. So in the meantime, users are tackling the problems in whatever way is economically possible. At some of the bigger sites, like Ford Motor Co. and General Dynamics Corp., internal software projects are under way.

Doug Lewis, director of CAD/CAM at General Dynamics, said his company dismissed the idea of developing one centralized data base and has instead opted for a centralized meta-data base, or a centralized data base for information regarding CAD/CAM data. The company is working with Computer Corporation of America to develop this customized system.

"We want to blur it to a point where it doesn't matter where we put the data," Lewis said.

The idea is to manage a centralized data base that is updated automatically on the status of all CAD/CAM data. Users can then access the meta-data base to locate specific data.

At Ford, a hierarchical data management technique is under development, according to Wayne Hamann, manager of computer-aided engineering systems development.

In this case, the highest level is a centralized directory that functions like a card catalog in a library by giving an overview of corporatewide CAD/CAM activity. Below that is the mid-level data base, which functions in a similar manner to the corporatewide directory but is designed for various CAD/CAM divisions.

Next would come local data bases with "more detailed and refined information" on specific projects or departments, according to Hamann. The local data base would have limited access, since most of the data revisions would be made at this level.

The software for this system has been developed internally. A pilot project is under way in Europe, Hamann said, and may eventually be marketed commercially.

"If you develop a CAD/CAM system, it had better be, for your sake, on a relational foundation."

— E. F. Codd
Codd & Date Consulting Group

In this issue

NEWS

Compaq and Hewlett-Packard answer IBM's price cuts with discounts on their own microcomputers/ 4

As the IBM 8100 slips quietly to its death, IBM considers migrating users to the 370 architecture/ 6

Wang expands its networked office automation offerings by introducing a voice and data system operating over standard twisted-pair wire/ 12

AT&T Conversant Systems unveils a second voice recognition product/ 13

Users say they want MSA applications and will count on the company to interface them with other vendors' data base management systems/ 15

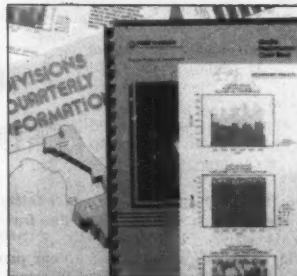
SYSTEMS & PERIPHERALS

The IBM 3295 terminal has found at least one niche in New York financial circles/ 19

Sperry adds the second disk subsystem in six weeks to its mainframe-class product offerings/ 19

MICROCOMPUTERS

IBM shows an experimental desktop speech-recognition product that creates documents in response to human dictation/ 25



See Page 67

Ashton-Tate announces software packages that add to the capabilities of Framework II and Dbase III Plus/ 25

COMMUNICATIONS

Multivendor network users look for nuts-and-bolts solutions at the Network Management Technical Conference/ 31

AT&T and IBM square off in a battle for network supremacy, an analyst tells seminar attendees/ 31

SOFTWARE & SERVICES

Pacific Bell fails to bill its customers for more than \$35 million in long-distance calls and traces the accident to a logic error in a rewritten program/ 41

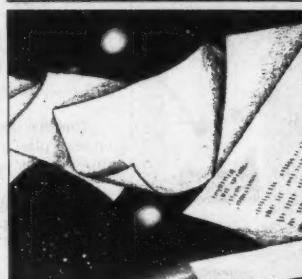
A Long Island, N.Y., bank finds that Excelerator automated graphics tool encourages use of structured methodology and has other uses as well/ 41

COMPUTER INDUSTRY

Computer Associates may be scaling back its development of micro software after its aggressive moves into the micro mart in recent years/ 142

AT&T Chairman Charles Brown downplays the significance of his company's recent decision to cease all its computer-related trade with South Africa/ 142

PRODUCT SPOTLIGHT



See Page 45

More than 85,000 page printers were shipped to end users in 1985 and nearly 350,000 are expected to ship annually by 1990. Advances in technology and vendor price/performance make this an auspicious time to purchase a page printer. By Computerworld associate editor Amy Sommerfeld/ 45

IN DEPTH

Million-dollar graphics: Visual information systems turn data bases into graphic information, converting data processing into a strategic and competitive weapon. By Alan Paller/ 67

System/38 grows up: The System/38 was once IBM's political scapegoat. Now, with its enhanced architecture, the system maintains a strategic position as IBM's main mid-range computer for the future. By David Andrews and Frederick Manteghian/ 79

OPINION & ANALYSIS

Mallach on the epidemic of overspending on IBM mainframes/ 17

Charles Bender on the influence of vector and parallel processors/ 19

Eric Bender on the outspoken leaders of the microcomputer industry/ 25

Horwitt on the X.400 international communications standard/ 31

McEnaney on the migration of Pick installations into the corporate marketplace/ 41

Wilder on responses to IBM's lackluster quarterly results/ 142

DEPARTMENTS



See Page 16

Editorial/ 16
Turnaround Time/ 18
New Products/ 87
Calendar/ 109

Page one illustration by A. D. Hopkins

TURBO

**Why are SYBACK
& SyncSort CMS
the fastest things
on no wheels?**

**(More technology
in the tank!)**

Call (201) 930-9700.

Arrange a test drive.

You say you've always had very simple tastes? All you ever wanted was the best?

Well, step into our showroom and kick a few tires! We'll show you two programs that are the Ferrari and Lamborghini of VM programs.

- **SYBACK** – the world's fastest and most maneuverable backup, restore and copying program;
- **Syncsort CMS** – the world's fastest and most maneuverable VM/CMS sort program.

What makes 'em so special? Well . . .

(1) TURBO PERFORMANCE: Have you ever stepped down on the gas in a dangerous driving situation and discovered . . . nothing? Well, that'll never happen to you with these two vehicles.

Both are equipped with our special brand of "software turbocharging." We call it FBT, which stands for Fluid Buffering Technique. Our competitors call it something else.

We discovered FBT one dark and rainy night when we were trying to find a way to speed up the movement of data in sort programs. After crying "Eureka," we applied it to our OS and DOS sort programs. The results were . . . wow!

Now we've carried that bright idea over into VM dump-restore and sort programs. And the results are still wow! Compared to any other backup or sort program clogging the nation's VM thruways today, SYBACK and SyncSort CMS will save you up to:

- **50% in Elapsed Time;**
- **45% in VTime;**
- **55% in TTime;**
- **75% in SIOs.**

So who needs all that speed? You do. If you want to optimize your VM operations, stay out of needless DP traffic jams, and make the boss happy with your throughput.

Here's what happened to one large government agency: Their backup operations used to require a full 24 hours to complete. Then they installed SYBACK. Now their backup takes — are you ready? — one-half hour!

(2) EASY HANDLING: SYBACK and SyncSort CMS are among the most flexible, user-friendly programs ever produced by anybody anywhere. That's one reason programmers love 'em. And where does it say that backup and sort operations have to be hard to be good?

(3) "MISTER SOFTWRENCH" SERVICE: We've got the best pit crew in the business. More than 85% of all customer requests are resolved within 24 hours.

If you'd like to put a little high technology in your VM tank, give us a call. We might even take your used VM dump-restore or sort program as a trade-in!



syncsort
INC.

Syncsort Incorporated 50 Tice Boulevard, CN18, Woodcliff Lake, N.J. 07675

NEWS

Compaq, HP offer price cuts on IBM-compatible micros

Portable line discounts range from 3.5% to 17%

By Peggy Watt

It did not take IBM Personal Computer-compatible makers long to react to the price cuts announced earlier this month by IBM. Last week, Compaq Computer Corp. unveiled new models of two computers, and Compaq and Hewlett-Packard Co. cut prices on their personal computers.

The other major compatibles manufacturer, AT&T, gave no indication of plans to cut prices on its PC 6300 line, but a spokesman pointed out that AT&T dropped the price of the hard disk, single-floppy model from \$4,985 to \$4,485 in February.

IBM cut prices on models of its hard disk-equipped Personal Computer XT and 80286-based Personal Computer AT as much as 25% and dropped the price on its basic Personal Computer from \$1,595 to \$1,095 [CW, April 7].

Compaq, of Houston, introduced new high-end models of its Compaq Portable II and Compaq Deskpro 286,

each with a 20M-byte hard disk drive instead of the earlier models' 10M-byte drives. The new Model 4 of the Portable II is \$4,999 with \$350 upgrades for Model 3 owners available until June 16. The new Deskpro 286 Model 3 will replace the earlier configuration at a 26% lower price, \$3,144.

Other price cuts ranged from 3.5% to nearly 17% across the line of Compaq Portable 286 models, Compaq Deskpros and Compaq Deskpro 286s.

Palo Alto, Calif.-based HP likewise cut prices of its Vectra Personal Computer as much as 10%, depending on configuration, and dropped the prices for system components and accessories by as much as 40%. The biggest cut was in the high-end Vectra Office Model 2, with 640K bytes of random-access memory, one 360K-byte floppy disk drive, 20M-byte hard disk, color adapters and lock, down to \$5,299 from \$5,984.

Internal hard disk drives dropped 8% to 14% in price. The price of a 128K-byte memory expansion kit fell from \$125 to \$70 and 1.2M-byte internal floppy disk drives dropped from \$450 to \$275.

on development models by up to 25%.

With the 3610 scheduled to ship in volume in October, Noftsker estimated that between 100 and 200 systems will be sold by year-end. He predicted more rapid growth during 1987.

Incorporating proprietary gate-array very large-scale integrated technology, the 3610 offers the same performance as Symbolics' 3640 development system, which will continue to be offered, but takes up about one-quarter the volume. The 3610 carries a single-quantity sticker price of \$44,900 that drops as low as \$31,500 in volume sales.

The system features a 19-in. monochrome console, 4M bytes of internal memory, 190M bytes of hard-disk storage and a runtime version of the firm's LISP environment software.

The 3610 was not demonstrated in action because the system software is not fully mature, Noftsker said. But the new machine still drew favorable reviews from analysts and

TOP OF THE NEWS

NEWS from page 1

The delivery schedule now has the four-processor 3090 Model 400, which already had its shipments advanced once before, being delivered in October rather than November, and the Model 150 uni-processor being shipped in June rather than October. The memory chip, developed at IBM's Essex Junction, Vt., semiconductor plant, will be used for memory upgrades and model upgrades in 3090s.

Mips Computer Systems, Inc. next month will introduce a line of semiconductors based on its proprietary reduced instruction set computer technology. Prime Computer will use the chips in the RISC-based machine it plans to introduce early next year.

Financially troubled microcomputer software distributor, First Software Corp. of Lawrence, Mass., has been put up for sale because of creditor demands. Sources close to the firm indicate that Solitaire, Inc., a Hayward, Calif., company owned by John Martin-Musumeci, has signed a letter of intent to acquire at least half of First Software.

software vendors, who said it should quicken the commercial acceptance of AI-based software.

Newquist estimated this year's market for dedicated symbolic processors at \$180 million, with overall hardware spending on AI pegged at \$150 million. Symbolics' current annual sales will exceed \$120 million, according to Noftsker.

Philip Cooper, president of Palladian Software Corp. in Cambridge, Mass., called the 3610 unveiling "great news, although it's not a surprise." It demonstrates Symbolics' intentions to become much more cost-competitive with the general-purpose 32-bit workstations that represent another option in delivering AI applications, he said.

"Overall, it's a good move," said Curt Monash, senior vice-president at Paine Webber, Inc., who forecast that the 3610 will be well positioned to capture the high end of the AI delivery market — when that market finally appears.

Noftsker downplayed what many see as a major threat from Texas Instruments, Inc.'s upcoming LISP-on-a-chip processor. "They're starting so far behind in technology that they can't make it up by exploiting their expertise in silicon," he told *Computerworld*.

New features in Symbolics' LISP 7 primarily target an integrated development/delivery environment, with enhancements designed to boost both programmer productivity and ease-of-use features in the resulting applications. Speed reportedly also will increase about 25%.

Revised pricing for development systems ranges from \$49,900 for a low-end System 3640 to \$116,900 for a System 3675. Symbolics also cut memory prices by about one-third, introduced a 368M-byte disk drive for some 3640 models and announced a 515M-byte disk drive for 3670s priced at \$17,000.

AI tool seeks wider market

From page 1

"It's a good little machine, and it's fairly aggressively priced. It will bring them into areas where they've never been before," said Harvey Newquist, editor of the "AI Trends" newsletter, published in Phoenix.

Compatible with earlier Symbolics systems, the machine also will give developers "a seamless transition from development to delivery," Noftsker said. That will speed developers' creation of commercial applications such as rule-based financial management systems, he added.

The Concord, Mass., supplier also announced a new release of its Symbolics LISP development environment, scheduled for October delivery, and cut prices across the board

COMPUTERWORLD

Publisher
Donald E. Fagan

Editor in Chief
Terry Catpolio

Executive Editor
Sharon Frederick

News Director
Peter Bartolik

Senior Editors
Eric Bender, Microcomputers
James Connolly, Systems
Clinton Wilder, Industry
Elizabeth Horvitz, Communications
Charles Babcock, Software

Senior Writers
Donna Raymond
Rosemary Hamilton
Eddy Goldberg
Douglas Barney
Stanley Gibson
David Bright

New Products Editor
Suzanne Wexel

Features Director
George Hamar

Senior Editors
Janet Federo
Glenn Rifkin

Associate Editors
Amy Sommerfeld
Becky Balcha

Assistant Editor
Barbara Wierzbicki

Assistant Editor
Deborah Fickling

Senior Writer
Michael L. Sullivan-Traitor

Managing Editor
Donovan White

Chief Copy Editor
Charlotte Ziemis Donaldson

Assistant Chief Copy Editor
Pamela Heel Erickson

Copy Editors
Julie Cook
Penny Janzen

Copy Editors
Susan Miller
Kelly Shea

Copy Editors
Steven M. Ulfelder
David W. Bromley

Design Editor
Marjorie Magowan

Graphics Editor
Mitchell J. Hayes

Graphic Designer
P. Charles Ladouceur

Assistant to the Editor in Chief
Pam Dornik

Editorial Assistants
Patricia Faherty
Christie Sears

Editorial Assistants
Nancy Shannon
Linda Gorgone

Editorial Assistants
Laura Fredrickson

News Bureaus
Mid-Atlantic
201/967-1350

News Bureaus
West Coast
415/328-8064

News Bureaus
Southeast
404/394-0758

News Bureaus
Southwest
415/328-8064

News Bureaus
Northeast
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

News Bureaus
Southwest
415/328-8064

Second-class postage paid at Framingham, Mass., and additional mailing offices.

Computerworld (ISSN-0010-4841) is published weekly, except: January (5 issues), February (5 issues), March (6 issues), April (5 issues), May (5 issues), July (5 issues), August (5 issues), September (6 issues), October (5 issues), November (5 issues), and a single combined issue for the last week in December and the first week in January by CW Communications, Inc., 375 Cochituate Road, Box 9171, Framingham, Mass. 01701-9171.

Copyright 1986 by CW Communications, Inc. All rights reserved.

Computerworld can be purchased on 35 mm microfilm through University Microfilm Int. Periodical Entry Dept., 300 Zeeb Road, Ann Arbor, Mich. 48106. *Computerworld* is indexed: write to Circulation Dept. for subscription information.

PHOTOCOPY RIGHTS: permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by CW Communications, Inc. for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of \$3.00 per copy of the article, plus \$.50 per page is paid directly to Copyright Clearance Center, 21 Congress Street, Salem, Mass. 01970.

Permission to photocopy does not extend to contributed articles followed by this symbol. ‡

Special requests for reprints and permissions only should be addressed to Nancy M. Shannon, CW Communications, Inc., 375 Cochituate Road, Box 9171, Framingham, Mass. 01701-9171. Subscriptions call toll free (800) 544-3712 or (215) 768-0388 in Pennsylvania.

Subscriber rates: \$2.00 a copy; U.S. — \$44 a year; Canada, Central & So. America — \$110 a year; Europe — \$165 a year; all other countries — \$245 a year (airmail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin.



POSTMASTER: Send Form 3579 (Change of Address) to *Computerworld*, Circulation Department, P.O. Box 1016, Southeastern, PA 19398-9964.

Why is MODEL 204 the pacemaker for handling larger databases?

Heartbeat response.

When it comes to fast response to queries and updates, there's no database too large for Computer Corporation of America's MODEL 204.

In fact, against the competition, the bigger the database, the better we look. Here's an example:

A large travel agency with 900-plus on-line terminals uses MODEL 204 to maintain information on accommodations and transportation options around the world. In a benchmark simulating 1,000 users, 1,920 complex transactions were made in one minute on the travel agency's 2-gigabyte database. Response time? An average of 1.1 seconds.

The simple fact is, there is no relational-based DBMS that can store more, or handle it faster than MODEL 204, no matter how complex your queries get.

Like one large direct marketing firm that uses MODEL 204 for on-line real time sales tracking and analysis.

Their 10-gigabyte database contains 4,000 fields, of which 3,000 are keyed. Average response time to extremely complex queries of 3,000 or more transactions per minute? Less than 10 seconds. For less complex queries, response time drops to less than 2 seconds.

Heartbeat response. Another way of saying MODEL 204.

Get the facts. Write John Donnelly, V.P. Marketing, Computer Corporation of America, Four Cambridge Center, Cambridge, MA 02142. Or, call 1-800-258-4100, extension 603.

Computer Corporation of America



A Crowntek Company

Software innovators creating better ways to manage business.

NEWS

IBM freezes 8100, considers moving DPCX to 370 hosts

By James Connolly

RYE BROOK, N.Y. — Introduced as a key element in a distributed processing strategy in 1978, IBM's 8100 Information System apparently has suffered a quiet but long-predicted death.

IBM officials confirmed last week that the 8100 hardware family and the DPCX operating system will not be functionally enhanced in the future, but they assured users that the 8100's other operating system, DPPX, will be enhanced and is being considered for a move onto 370-based systems.

IBM's Data Systems Division reportedly first issued its 100-word statement on the 8100 last month at the Guide and Share IBM users groups' meetings in Anaheim, Calif., which were closed to the press.

An IBM spokesman said last week that the 8100 is still available and will be sold to customers where it meets customer requirements. He said the evaluation of moving DPPX into the 370 environment will be completed in early 1987.

Although the spokesman said that DPCX is stabilized and that no functional enhancements are planned, IBM announced the next day the availability of DPCX Release 6 and Release 6 of Distributed Office Support Facility (DOSF).

DPCX Release 6, which the company said was not a major functional change, adds support for DOSF Release 6. DOSF Release 6 was designed to add several print functions and to support IBM's Personal Computer AT, Portable PC, Quietwriter, Wheelprinter, Proprietary and Jet Printer.

While decisions to stop enhancing products sometimes are met with anger, one 8100 specialist viewed the

IBM announcement as good news.

"No one expected something called the 8100 to go on forever. What the users are concerned about is having to rewrite all of their applications. I think the only surprise is that IBM made a public statement and revealed as much as they did, that they are thinking about porting over an operating system to another architecture," said William Ackermann, vice-president for distributed systems at DPX, Inc., a Cupertino, Calif., systems house that publishes the "Update/8100" newsletter.

Ackermann said he expects DPPX to show up on a new small 370-based system. "DPPX users have known that they were going to have to migrate to new hardware. It is part of doing business in today's business world," he added.

International Data Corp.'s IBM analyst, Frank Gens, said of the announcement, "It's not too surprising since we have been talking about it for three years now. It is just a little earlier than some people expected. IBM as a manufacturer has a requirement to produce a limited number of high-volume hardware lines."

Gens estimated that the 8100 family had an installed base of only 15,000 systems at the end of 1985. He said the product line had been squeezed out of the mid-range market by other IBM systems.

"The 8100 suffered because of its high price and its performance. It suffered when compared with the 4331 and 4341 because it was viewed as being underpowered in comparison with those systems. If you looked at it as a PC server, it was viewed as an expensive PC server when compared with the Series/1, the System/36 and even the System/34," he said.

Sperry expands Series 5000

Mid-range, high-end supermicros broaden Unix-based family

By James Connolly

BLUE BELL, Pa. — With its sights set on new customers rather than on its installed base in the scientific, educational and energy fields, Sperry Corp. last week added two models to its Unix-based Series 5000 microcomputer family.

The 5000/50 and the 5000/90 use AT&T's Unix System V and the Motorola, Inc. 68020 microprocessor rather than the Motorola 68010 that was the CPU in the earlier Series 5000 systems.

The Model 50, supporting up to 32 interactive users, fits near the existing Model 60 at the mid-range of the Series 5000 family, while the Model 90, with room for up to four CPUs supporting 88 interactive users, is the new high-end system in the Series 5000 line.

Aimed at new accounts

A company representative said the Series 5000 is aimed more at new accounts than at existing customers.

The Model 50, made for Sperry by NCR Corp., uses a 16.67-MHz CPU and features up to 16M bytes of random-access memory (RAM) and 8K bytes of cache memory. A Motorola

68881 floating-point processor is optional.

A minimum configuration of the Model 50 includes the CPU, 8K bytes of cache, 2M bytes of RAM, an 85M-byte hard disk, a 45M-byte streaming cartridge tape, eight asynchronous ports, two synchronous ports and one parallel port. The Model 50 is available now at prices ranging from \$23,030 to \$28,530 for basic hardware.

RAM memory range of 4M to 16M bytes

The Model 90 has a memory range of 4M to 16M bytes of RAM and supports 8K bytes of cache and a standard 68881 floating-point processor.

A minimum configuration includes a CPU, the floating-point processor, 8K bytes of cache, 4M bytes of RAM, a 160M-byte fixed disk, a 45M-byte streaming tape, a four-channel direct memory access controller, 16 synchronous or asynchronous ports and two parallel ports.

The direct memory access controller permits a maximum of 16 disk drives or tape drives for a maximum storage capacity of 8G bytes. Basic hardware costs \$68,300 to \$74,300. The Model 90 will be available in June.

System options, workstations and software licenses are priced separately.

Field upgrades for the existing Models 40, 60 and 80 will be available in July.

HOW TO SPOT THE LEADER AMONGST THE LED



We knew it was a great idea to offer 3270 system users an intelligent alternative to IBM's limited and expensive selection of printers. The AGILE family of products has created a new segment of 3270 users who now have a real choice when they select ASCII printers and plotters—a choice based solely on their needs, not the restrictions of a vendor.

We also knew our ideas were bound to create numerous competitors trying desperately to do what we do.

However, as a printer/plotter protocol converter, the engineering and design excellence of the AGILE 6287 is difficult to imitate. The 6287 supports full-featured emulation of most IBM 3270 printer applications, including APL. It provides built-in diagnostics, internal power supply, and fan cooling. The 6287 is backed by a full two-year warranty, and AGILE's commitment to individual service and reliable customer support.

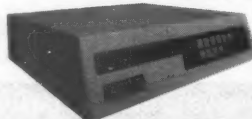
Freedom and economy—for plotters, laser printers, dot matrix, daisy wheel or high speed printers, the reasons to choose the AGILE 6287 are obvious. Call us today for more information on the AGILE family of products. In the meantime we'll pass the word to our competition.

The masquerade is over.

AGILE

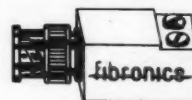
4041 Pile Lane, Concord, California 94520
(415) 825-9220 Outside California (800) 538-1634

**CONNECT ASCII
PRINTERS & PLOTTERS
TO IBM 3270
CONTROLLERS**

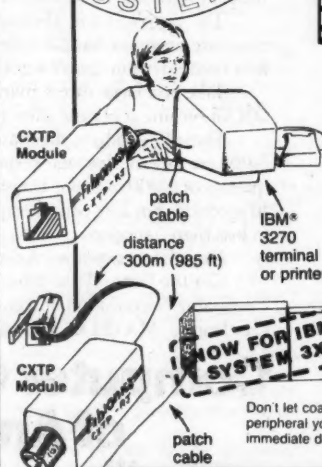


BUST THROUGH COAX EXPENSE!

Now dramatically reduce costly coax cable requirements with the compact, easy-to-install CXTM (coax-to-twisted pair) Module.



screw terminals or RJ-11 receptacle



The CXTM MODULE is a new addition to the Fibronics line of COAX BUSTERS that includes the D&V MULTIPLEXER (achieves simultaneous data and voice transmission over telephone twisted pair wire) and the COAXIAL DOUBLER™ (doubles the capacity of an existing coax cable).

IBM® Category A Controller

Don't let coax hassles keep you from installing the peripheral you need now! Call our 800 number for immediate delivery and new low prices!

325 Stevens Street • Hyannis, Massachusetts 02601 • Telex 951297

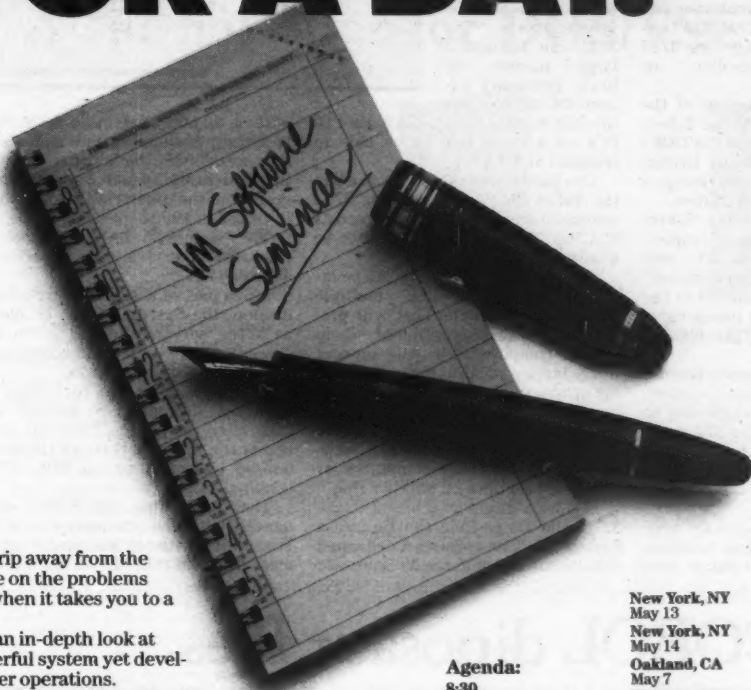
Fibronics International Inc.
fiberoptic communications

1-800-DOUBLER

or (617) 778-0700

DO SOMETHING POSITIVE FOR YOUR DATA CENTER.

LEAVE IT FOR A DAY.



There's nothing like a little trip away from the office to give you perspective on the problems you left behind. Especially when it takes you to a free VM Software Seminar.

Each seminar provides an in-depth look at VMCENTER—the most powerful system yet developed for control of data center operations.

You'll see how VMCENTER simultaneously addresses all your major concerns as a VM data center manager. System security, resource accounting and budgeting, workload balancing, disk and tape management, data recovery—plus much more.

You'll also get a chance to meet your fellow managers and system programmers. And get all the particulars on how they're handling situations similar to yours.

So don't wait. Come to a VM Software Seminar. And come out stronger than ever.

Seminar topics include:

System Table and DASD Analysis—A VMCENTER utility that tells you who is using how much DASD by producing a consolidated map of all the DASD space on your VM system.

Minidisk Utilization Analysis—A VMCENTER utility that helps you to find more available DASD by creating exception reports to identify problems like underutilized DASD space, unformatted CMS disks, obsolete minidisks, and more.

Generalized Report Writer—a utility you can use to simplify the production of special reports if you need more than the 60-plus preformatted reports provided with VMCENTER.

You'll also see in-depth descriptions of the seven free-standing components of VMCENTER—VMACCOUNT, VMSECURE, VMSCHEDULE, VMSORT, VMBACKUP, VMARCHIVE, and VMTAPE.

And, we'll give you a preview of new developments to be released.

Cost:
Everything's free. Even lunch.

Agenda:

8:30
Coffee and Registration
9:00
Increasing Data Center
Productivity
12:30
Complimentary Lunch

Seminar Dates and Locations

Atlanta, GA
May 1
Buffalo, NY
April 22
Calgary, AB
April 24
Cherry Hill, NJ
May 12
Chicago, IL
May 9
Cleveland, OH
April 23
Denver, CO
May 21
Detroit, MI
April 25
Hartford, CT
May 15
Kansas City, MO
May 19
Long Beach, CA
May 6
Minneapolis, MN
April 24

New York, NY
May 13
New York, NY
May 14
Oakland, CA
May 7
Phoenix, AZ
May 20
Portland, OR
May 5
Providence, RI
May 16
San Antonio, TX
May 2
San Jose, CA
May 8
Toronto, ON
April 23
Washington, DC
April 21

Call (800) 562-7100
for Seminar Enrollment.
(703) 821-6886 in
Virginia and outside
the continental US.



2070 Chain Bridge Road
Vienna, VA 22180

NEWS

IBM links 370 to Token-Ring

From page 1

ken-Ring. "We at Travelers believe that the Token-Ring is a strategic element in a large company's data processing environment," said Dave Kimball, marketing director for Packet/PC, Inc., a Farmington, Conn.-based spin-off of the Travelers Insurance Co. of Hartford, Conn. "There are a lot of great communications things that are coming down the road, and the Token-Ring gives us a little more horsepower to take advantage of them."

When all the announced IBM products become available, the Token-Ring could serve as an integral part of a corporation's overall information processing strategy, users claimed. The Token-Ring will be able to connect to other Token-Rings, and up to eight rings can simultaneously communicate with the IBM 370 family of mainframes through the 3725 communications controller or through a System/36.

"We think the connection of the System/36 and the 370 to the Token-Ring significantly strengthens IBM's office scenario," said Marty Gruhn, vice-president of the Sierra Group, a Tempe, Ariz.-based research firm.

Gruhn cautioned that the Token-Ring may be an expensive proposition for most corporations. "Our estimates are that it costs approximately \$8,500 to attach a System/36 to the Token-Ring. That is not inexpensive for just an attachment," Gruhn also said.

IBM announced a special feature on the 3725 communications controller that will attach a Token-Ring to the 3725 and through the 370 channel to the mainframe. "This will fill a need for the much-ballyhooed high-speed micro-to-mainframe link," Steen said.

"The announced products are very helpful," said Alex Stankus, telecommunications manager for Allied Ben-

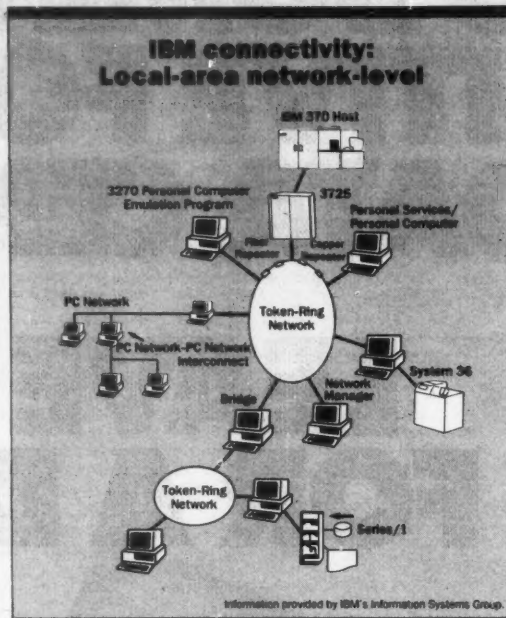
dix Aerospace headquarters in Arlington, Va. The direct connection from the Token-Ring to the 3725 controller is especially of interest, Stankus said, but he plans to wait until he can see it work before making a purchasing decision.

IBM's Steen said that figures were not yet available for aggregate data rates supported by the 3725. Throughput speeds of individual PC-to-mainframe connections, he added, would depend on a number of factors, such as the size of the message, amount of traffic and how many rings the device supports. "The 3725 can support a large number of lines; you can't expect 4M bit/sec. per line any more than you can expect 10 PCs on a token-ring to be able to transmit at 4M bit/sec."

The hardware required to connect the Token-Ring to an existing 3725 communications controller costs \$26,760. These products will not be available until January 1987.

Because up to 260 nodes can be attached per Token-Ring, multiple rings attached to the host will provide wide-scale connection of PCs to a host computer. "It will support fairly large numbers of users, meaning up to a thousand or maybe more," Steen said. However, a personal computer on one ring can identify, and therefore communicate with, a maximum of 16 personal computers or software programs on another ring.

Besides a direct attachment to the 3725, the Token-Ring can tie into a System/36. This requires a dedicated IBM Personal Computer AT equipped



with a \$2,500 System/36 LAN Attachment; communications software that costs \$925; the latest release of the System/36 System Support Program; and the token-ring PC Adaptor II, priced at \$895.

The System/36 LAN Attachment feature will be available in second-quarter 1987.

When part of a Token-Ring configuration, the System/36 can be used as a file server, allowing users to share data, store files and access applications on the System/36.

Users can download files from a 370 host through a System/36 to their microcomputers. They can also access the 370 host through the System/36 by emulating an IBM 3270 terminal.

The Token-Ring itself was enhanced with the announced \$1,495 Token-Ring Network Manager, a software program that allows an opera-

tor on a dedicated micro to evaluate the status of a single ring and perform problem determination and error monitoring. Workstation network adapters monitor network traffic and notify the Network Manager when network noise or frequency of errors exceeds a predetermined figure, Steen said.

Once the Network Manager has identified a network failure, it can remotely disconnect the workstation from the ring and bring it up later when the problem is solved. The product will be available in July 1986.

Also announced was Series 1 Office Connect, which allows the Series 1 to act as a communications server to both IBM and non-IBM systems. Priced at \$6,000, it will be available in first-quarter 1987.

IBM also enhanced the Token-Ring's ability to communicate over long distances with the announcement of the 8219 optical fiber repeater and the 8218 copper repeater, which amplify the signal on network wiring and will be available in June 1985. The \$1,650 optical repeater extends the network's range to 2 kilometers between wiring closets and between buildings, while the \$1,095 copper repeater extends the range to 2,500 feet.

Multiple repeaters

Multiple repeaters can be used to increase the network's range. Token-Ring networks can be linked through the new Token-Ring Network Bridge Program, which costs \$1,495 and requires a dedicated PC AT. The Token-Ring Network/IBM PC Network Interconnect Program, a previously announced product, now also can bridge between PC Networks. Additionally, the PC Network can share the same broadband cabling media as industrial local-area networks that use the Manufacturing Automation Protocol (see related story, page 1).

Although shipment of many important pieces of the Token-Ring is close to a year away, some products will be available this year. "The ring-level products, the network manager, the bridge and a new higher performance card that is available for the PC for servers, are available within the next three months. Those are things that generally don't take a lot of planning," Steen said.

Still missing, however, are communications applications that will enable IBM PCs to communicate as peers with System/36s and 370 hosts via the new Token-Ring-based connections. "Those functions will be based on the APPC code that just became available. It will take time for people to write those applications," Steen said.

Corporations can soon begin to plan and implement some elements of an overall Token-Ring strategy. "You can begin to install the applications you want to install, including applications that will be accessed through a direct connection to the 3725. However, you can't install them in the direct connection. You have to run them over a communications line," Steen said.

Senior Editors Elisabeth Horwitt and Eric Bender contributed to this report.

The COBOL dinosaur flies...

...some people compare COBOL and its applications to a dinosaur. Well Micro Focus has succeeded in putting wings on the dinosaur and now he's entered a new generation. If you'd like to know how the new dinosaur can help you then just ask about Micro Focus' pioneering range of powerful compilers, productivity tools and integrated programming environments, such as VS COBOL Workbench—and then watch your productivity take off!

MICRO FOCUS

2465 East Bayshore Road, Palo Alto, CA 94303
Telephone: (415) 856-4161

CW4/21

Yes, I'm interested in the widest range of development products for PCs.
Single-user _____ Multi-user _____ PC DOS _____ Unix _____ Other _____

Programmer Workstations:

☐ VS COBOL Workbench

☐ Professional COBOL

Compilers:

☐ VS COBOL Compiler

☐ VS COBOL for Unix

☐ High Performance Level II COBOL

☐ Level II COBOL/ET

☐ Mac COBOL

Development Tools:

☐ ANIMATOR

☐ FORMS-2

☐ CO-Graphics

☐ CO-Maps

☐ CO-Math

Application Generators:

☐ Sourcewriter

Name _____

Title _____

Company _____

Address _____

City _____

State _____

Zip _____

Send to: Micro Focus Inc., 2465 East Bayshore Road, Palo Alto, CA 94303

Level II COBOL, VS COBOL Workbench, ANIMATOR, FORMS-2, Professional COBOL, CO-Maps, Mac COBOL, and CO-Graphics are trademarks of Micro Focus Limited. micro-PP is a registered trademark of Plessey Systems Inc. Sourcewriter is a trademark of Software Systems Limited.

NEWS

Ford installing PC Network

From page 1

developed jointly by Ford and IBM, could appear later on the market as a new IBM communications option, according to a source at Ford.

The broadband network does not displace Ford's continuing plans to implement the Manufacturing Automation Protocol (MAP) for manufacturing applications at its plants.

The MAP signals will be transmitted over the same broadband cable being installed for the network of Personal Computers, said Roger Zael, Ford body and assembly systems manager.

Zael also said the IBM PC terminals will eventually replace dedicated terminals and allow foremen and support personnel access to a variety of systems as well as to stand-alone microcomputer applications from a single terminal.

Ford and IBM actually signed the broadband network installation contract last December but announced it

last week as work began at the Wayne facility.

That prototype site project includes 60 PCs and is expected to be completed and in operation by July. Ford representatives would not speculate on the completion date of the entire project.

'Most laborious part'

The broadband cabling is already in place at Wayne and two other sites but will be "the most laborious part" of installation at the other sites, Zael added.

Each IBM PC will be able to communicate with Ford's IBM mainframes in Detroit through IBM's Systems Network Architecture protocol as well as to emulate terminals for the minicomputers typically present at individual sites: the Digital Equipment Corp. VAX, Hewlett-Packard

Co. HP 3000 and IBM Series/1.

The PCs will contain IBM Network adapter cards for printer- and file-sharing capabilities through IBM's PC Network. Ford is also developing some stand-alone and shared applications for the PCs, Zael said.

"What we're after is a universal terminal on the desk of the plant foreman," Zael said. He said the existing terminals will be reassessed when their lease contract comes due in 1988.

Complement, not compete with, MAP

He emphasized that the PC project will complement, not compete with, Ford's MAP plans. Besides running over the same broadband cable, MAP file transfers will be controlled over the same PC terminals. The first MAP installation is due to be completed in 1987 at Ford's Woodhaven, Mich.,

stamping plant, which will also get PCs shortly.

Sytek, Inc., the Mountain View, Calif.-based network manufacturer that supplies IBM with network boards used in the PC Network, views Ford's choice of the PC Network as a potential boost to the local-area network that many users thought would take a backseat to IBM's Token-Ring network.

"I think it helps set an attitude favorable to the use of broadband with the PC Network," said Sam Smith, branch manager of Sytek's Detroit offices.

Smith said Sytek will not be directly involved in this Ford project but has worked with other Ford broadband networks for manufacturing and office automation. He called Ford's network projects both extensive and effective.

Save up to 45% if you order before June 1

A special offer for DOS/VSE users:

We're making this special offer because we want people in DOS/VSE shops to find out what thousands of people in OS/MVS shops have known for years. When it comes to training, our books will not only outperform competing books, they'll also outperform seminars and multimedia packages. And after you use our books for training, you'll want to keep them for reference.

Frankly, it's unusual for a book to be effective both for training and reference. But, due to their unique modular organizations and outstanding illustrative material, all of our books are. That's why they've been used in thousands of OS/MVS shops since 1975. And that's why we are able to offer our unique guarantee: *If you aren't satisfied with our books, you can return them for a full refund...no matter how long you've had them.*

With that in mind, we'll gladly sell you one of our books for \$15, because we know you'll eventually buy some of our other books at full price. Books on CICS or DL/I. Books on COBOL or system development. In fact, if you buy one of our books for \$15 today, you're likely to become our customer for many years to come.

Mike Murach & Associates, Inc.

4697 W. Jacquelyn
Fresno, CA 93711



Buy either book for only \$15

DOS/VSE Assembler Language

This is a 1986 revision of the 1974 classic that's been used in thousands of DOS shops and dozens of colleges and universities. Because all VSE functions eventually get reduced to assembler language, this is a book that should be available for reference in every VSE shop. As we see it, the first eight chapters of this book are essential background for anyone who works with VSE. New material in this book shows you how to use VSAM via assembler language and how to develop assembler language programs using structured methods.

19 chapters 492 pages \$27.50

DOS/VSE JCL

Whether you're a VSE novice or expert, this 1985 book will improve your use of JCL. If you're new to VSE, this book will get you started right. Instead of copying other people's job streams, you'll learn what features of VSE to use and how to use them. If you're an experienced VSE user, this book will help you understand why you've been doing what you've been doing so you can do it better in the future. If you're the JCL expert in your shop, this book will help the other programmers solve their own JCL problems...so you can focus on the most challenging ones.

18 chapters 421 pages \$25.00

To order by phone,

call 1-800-221-5528
In Calif., call 1-800-221-5527

(Weekdays, 9 to 4 Pacific Std. Time)

Please mention this ad code: DV1/1

Our unlimited guarantee

You must be satisfied. If you ever feel our books aren't effective for your purposes, you can return them for a full refund...no matter how many you buy, no matter how long you have them.

Training managers

When used for self-instruction, our books have proven many times over that they can outperform any competing product (multimedia or otherwise) at any price. However, we also offer the aids that make it easy for you to use our books in a formal or informal training course. For **VSE Assembler Language**, we offer (1) an **Instructor's Guide** that includes a comprehensive case study, the case study solutions, and transparency masters; and (2) a **Minireel** that includes data and case study solutions so you can administer the case study with ease. For **VSE JCL**, we offer an **Instructor's Guide** that includes JCL problems, solutions, and objective tests.

Dear Mike: Please send me the books I've indicated below. If I'm not satisfied, I'll return them at any time for a full refund.

Send me the one book checked at the special price of \$15:

- ☐ **DOS/VSE Assembler Language** (regular price: \$27.50)
☐ **DOS/VSE JCL** (regular price: \$25.00)

Also send the indicated quantities of the following items at their regular prices:

- _____ **DOS/VSE Assembler Language**, \$27.50
_____ **Instructor's Guide for DOS/VSE Assembler Language**, \$50
_____ **Minireel for DOS/VSE Assembler Language**, \$50
_____ **DOS/VSE JCL**, \$25.00
_____ **Instructor's Guide for DOS/VSE JCL**, \$50

- ☐ Bill me for the books plus UPS shipping and handling (and sales tax in California).

- ☐ I want to SAVE shipping and handling charges. Here's my check or money order for full payment. California residents, please add 6% sales tax to your order total. (Offer only valid in U.S.)

Name and title _____
Company (if any) _____
Address _____
City, state, and zip _____ DV1/1

GSA to study site licensing policies for micros

By Mitch Betts

WASHINGTON, D.C. — The U.S. General Services Administration (GSA), which sets the policies on computer acquisitions by federal agencies, has launched an informal study to consider what agency policy should be toward site licensing for microcomputer software, GSA and industry officials said last week.

"The basic idea is to ascertain what approach the federal government should take when dealing with vendors in this area," said a GSA official who declined to be named. "At this stage, the government's whole position on site licensing is under review," the official said.

David B. Sturtevant, spokesman for the software industry's ADAPSO in Arlington, Va., said the GSA is expected to issue either mandatory regulations or nonbinding guidelines for federal agencies. He said ADAPSO will meet with the GSA this week to discuss the issues involved.

The federal government is a potentially large market for site licensing, since it has about 100,000 microcomputers, according to a 1985 survey by the U.S. Congress Office of Technology Assessment. For example, the International Trade Administration plans to obtain a site license for about 250 copies of Knowledgebase data base software from Micro Data Base Systems, Inc., of Lafayette, Ind.

Moreover, government agencies sometimes balk at buying copy-protected software, Sturtevant noted. The U.S. Air Force has reportedly refused to buy such software because the copy protection makes it difficult to use a hard disk and to create backup copies.

Site licenses typically give the user organization authority to make numerous copies of a master diskette for distribution at a user site.

NEWS

Tandem boosts Nonstop line

From page 1

tered at the extreme high end of the on-line transaction processing scale.

The Nonstop VLX, featuring processors based on very large-scale integration bipolar emitter-coupled logic/transistor-transistor logic gate-array circuit technology jointly developed with Motorola, Inc., delivers from 40 to more than 50 transactions per second in its smallest configuration, the company said. New circuit technology and an internal diagnostic subsystem also result in a 50% lower maintenance cost than is available with the existing Nonstop TXP.

One beta-site user, Bill Strange, manager of distributed communications support with Federal Express in Memphis, said his company has been operating a four-processor VLX for one month, mostly for batch processing, and has found it lives up to Tandem's claims. Strange could not comment on specific purchase plans but did say, "For the large-size systems that we need, it will certainly be a VLX."

Single VLX processor

A single VLX processor consists of two circuit boards, compared with four for the TXP, and incorporates a total of 31 gate arrays.

Four such CPUs, 32M bytes of main memory and 2.7G bytes of disk storage are required to form a basic VLX configuration, according to Gerald Peterson, vice-president of mar-

keting with Tandem.

From the entry-level configuration, the VLX can grow in four-processor increments to a maximum of 16 CPUs, 256M bytes of main memory and hundreds of gigabytes of disk storage inside the same cabinet. Because Tandem's architecture permits linear expansion, each four-processor increment increases throughput by another 40 to 50 transaction/sec., Peterson said.

One expert who said Tandem's VLX improves the company's competitive position with IBM was Omri Serlin, a consultant and researcher of the fault-tolerant market who heads Itom International in Los Altos, Calif. The VLX, Serlin said last week, could compete with the 3090 "possibly in some cases" where transaction processing applications produce heavy I/O loads and have relatively low

CPU requirements.

Linking VLX cabinets

Users who wish to link up several VLX cabinets can do so by means of a Fox II fiber-optic controller, also introduced last week. The Fox controller also allows as many as 14 VLX units, each containing 16 CPUs, to be linked at distances up to four kilometers. Up to 255 geographically distributed VLX nodes can be linked through the vendor's existing Expand networking software, Peterson said.

Serlin said the product "is a nice evolutionary system" for Tandem and incorporates technology that will be significant in future products. The performance boost over the TXP is substantial but not dramatic, Serlin said. "I wouldn't expect it to turn the entire industry on its ear," he said, but added that high profitability of the equipment may boost the company's financial performance when volume shipments begin.

David Wu, an analyst at Warburg Rowe & Pitman Akroyd, Inc. in San Francisco, said the price/performance of the VLX is "quite a significant improvement" over earlier Tandem models. "If you look at comparable systems — systems meaning systems, not CPUs — the cost of doing an automatic teller machine transaction per second on the VLX is about \$23,000; on the TXP it is about \$40,000."

Compatible with existing Tandem hardware and software, the VLX is integrated with Check, a diagnostic subsystem that uses expert system technology to automate many of the fault analysis tasks that would otherwise be performed manually. Through remote sensors and dedicated microprocessors, the Motorola 68000-based subsystem monitors the status of the VLX's processors, power supplies, fans and fiber optics.

Check also provides an optional dial-out capability that electronically reports urgent systems problems to Tandem's maintenance specialists by automatically calling the company's remote service centers, Peterson said.

The combination of an automated diagnostic subsystem and a threefold improvement in circuit reliability accounts for most of the VLX's maintenance-cost advantage over the TXP, he added.

Faster interprocessor bus

Compared with the TXP, the VLX provides a 65% faster interprocessor bus, rated at 40M byte/sec.

The bulk of the VLX's performance edge over the TXP stems from proprietary bipolar logic, which will form the "technological foundation" for Tandem's systems family for years to come, Peterson said.

Working with Motorola's semiconductor subsidiary, the supplier of on-line transaction processing systems developed a very large-scale integration 2,000-gate logic chip that gives the Nonstop VLX threefold-denser circuitry than Tandem's previous high-end system, the TXP.

The superior density reportedly contributes to the VLX's performance edge over the TXP by minimizing its number of components and interconnections.

Shipments of the Nonstop VLX, which costs slightly less than \$1 million in a basic configuration, are scheduled to begin during the current quarter.

WANG SOLUTIONS

WANG NETWORKING. BECAUSE THERE'S ALWAYS MORE THAN ONE WAY TO GO.

A computer network in a law office is quite different from a computer network in a university or a multi-national bank. And in time, all three of those networks will be different from what they are today.

That's why you need a network that's flexible enough to accommodate a wide variety of needs. And to change when those needs change.

You can get that flexible network from Wang.

A FLEXIBLE FRAMEWORK.

Wang Systems Networking (WSN) is more than a product or a group of products. It's a flexible framework that lets you integrate data, text, image, and messaging. From PC to mainframe. From one end of your organization to the other.

And because it's modular, WSN allows you to tailor your network using a variety of peer-to-peer transports — including WangNet, Wang's local area network, and switched or dial-up telephone lines — as well as international protocols such as X.25.

ALL SYSTEMS GO.

Although you may prefer Wang applications and systems, these systems often have to communicate with systems from other manufacturers. And with its open

architecture, WSN is flexible enough to operate in a multi-vendor environment.

For example, Wang systems can provide connectivity to IBM's SNA environment by emulating particular IBM systems such as the 3274 and 3777 Controllers. And the same is true in the world of PBX. In fact, we've already made compatibility agreements with AT&T, Northern Telecom, Mitel, GTE, Intecom, Jistel and Siemens.

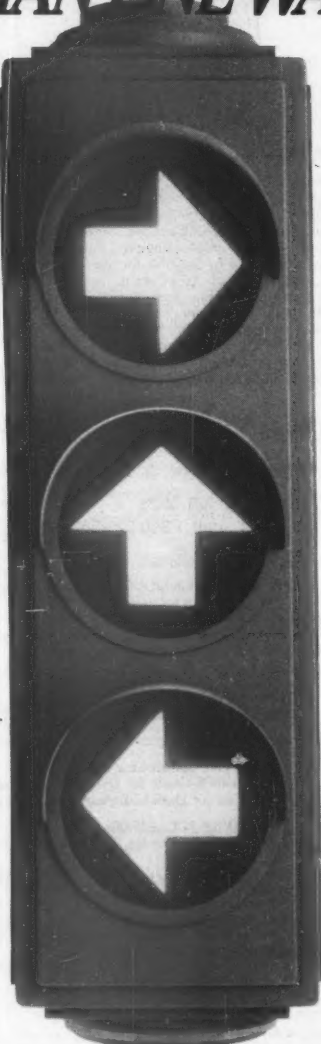
Wang also offers you gateways to other applications environments. These include gateways from the Wang VS to PROFS and DISOSS, IBM document exchange products, and to AT&T's UNIX environment.

CALL FOR THE WANG SOLUTION.

The Wang Systems Networking story is an extensive one. And it's all described in a 36-page booklet entitled *Wang on Networking: Integrated Solutions for Business Communications*.

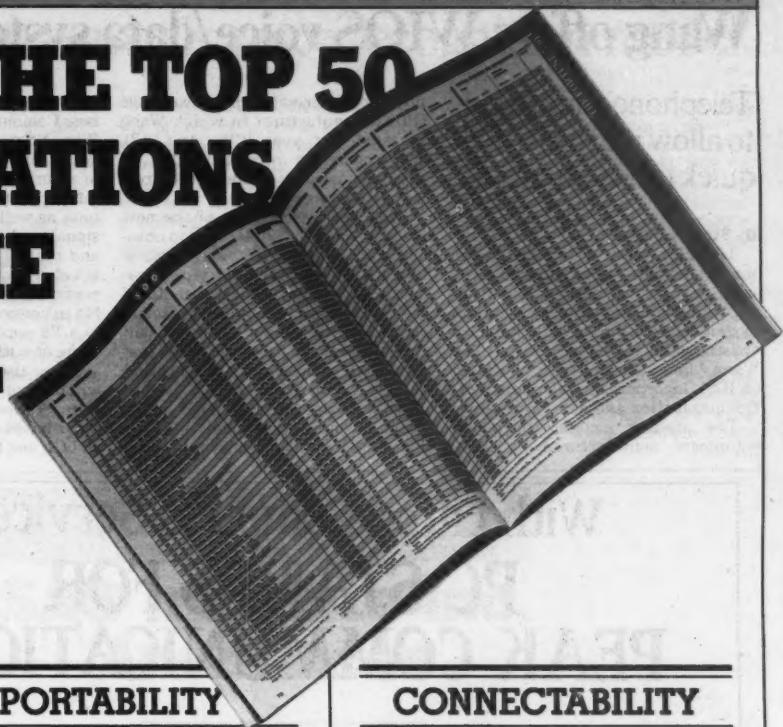
For your free copy call us today at 1-800-225-9264.

WANG



Oracle Corporation invites you to the last DBMS Seminar you'll ever have to attend.

WHY 31 OF THE TOP 50 U.S. CORPORATIONS USE THE SAME RELATIONAL DBMS: ORACLE



COMPATIBILITY

The ORACLE® relational database management system is compatible with IBM's SQL/DS and DB2. SQL/DS and DB2 represent IBM's latest generation of database management technology for IBM's largest computers. ORACLE's capabilities and user interface — the SQL language — are identical to those of SQL/DS and DB2. Programs written for SQL/DS and DB2 will run unmodified on ORACLE.

PORTABILITY

SQL/DS and DB2 run only on IBM mainframes; ORACLE runs on IBM mainframes, DEC, DG, AT&T, HP, Stratus, Sperry, Prime, Honeywell and several other manufacturers' minicomputers, and on a wide range of microcomputers including the IBM PC/XT and PC/AT. ORACLE runs under vendor-proprietary operating systems or under UNIX™. All versions of ORACLE are identical and include a complete implementation of SQL — not a subset.

CONNECTABILITY

Having the same software running on your mainframe, minis, and micros greatly simplifies the task of connecting your machines into a network. ORACLE's network software allows microcomputer users to directly access data stored in the shared database on the mainframe or minicomputer, or copy that data into the database on their micros and operate independently.

Oracle introduced the first relational DBMS and the first implementation of SQL back in 1979. Today, the largest companies around the world use ORACLE. In fact, INC MAGAZINE ranks Oracle as the fastest-growing major software company in the USA. Surprised? Don't be. ORACLE is the number one relational DBMS, with thousands of installations on IBM mainframes, DEC, DG, HP and most other vendors' minis and micros, including the IBM PC.

To attend the next free, half-day seminar in your area or receive additional information, write Oracle Corp., Dept. CW10, 20 Davis Drive, Belmont, CA 94002, or call 1-800-345-DBMS. From now on, it's the only DBMS phone number you'll ever need.

ORACLE U.S. and Canadian Seminar Schedule

Albany	April 17	Des Moines	March 19	Montreal	April 16, May 14	Saginaw	April 24
Albuquerque	March 6	Detroit	March 13, April 8, May 7	New Orleans	May 21	Salt Lake City	April 3
Amarillo	March 4	Ft. Lauderdale	April 10	New York City	March 11, 19,	San Antonio	April 22
Atlanta	April 22	Ft. Worth	March 11		April 9, 22, May 14	San Diego	April 17
Austin	March 25, May 27	Halifax	March 19	Newport Beach	March 18, May 13	San Francisco	March 25, April 24
Boise	March 20	Houston	March 20, April 17, May 15	Oklahoma City	April 15	Seattle	April 3
Boston	March 11, April 15, May 13	Huntsville	May 8	Omaha	April 22	Sunnyvale	March 11, April 10, May 8
Chicago	March 13, April 16	Indianapolis	March 11	Orlando	April 9	Syracuse	May 8
Cincinnati	March 4	Iselin, NJ	March 20, May 15	Ottawa	March 13, April 10, May 8	Toronto	March 4, April 8, May 6
Cleveland	April 2	Kansas City	May 6	Philadelphia	March 20	Tulsa	May 20
Columbia, SC	March 11	Lansing	March 11	Phoenix	March 27	Vancouver, BC	April 22
Columbus	March 5	Little Rock	May 13	Portland	March 4, May 6	Washington	March 5, 19,
Convent Station, NJ	April 7	Los Angeles	March 13, April 8, May 8	Quebec	June 18		April 9, 22, May 7
Dallas	April 1, May 6	Lubbock	April 8	Rochester	March 18	Wichita	April 15
Dayton	April 3	Milwaukee	May 21	Sacramento	May 13	Winnipeg	April 17
Denver	March 13, April 8, May 15	Minneapolis	March 27	St. Louis	April 9, May 14	Winston-Salem	March 27

ORACLE®

Relational in the product, as well as on the label

Call (800)345-DBMS today.

Ottawa (613) 238-2381 ☐ Quebec (514) 337-0755 ☐ Toronto (416) 362-3275

ORACLE U.K. (SURREY) 44-1-948-6976 ☐ ORACLE EUROPE (NAARDEN, THE NETHERLANDS) 31-2159-49344

© 1986 by Oracle Corporation. ORACLE® is a registered trademark of Oracle Corporation. SQL/DS, DB2 and IBM are registered trademarks of IBM. DEC, DG, AT&T, Stratus, HP and Bell Laboratories own numerous registered trademarks. TRBA.

NEWS

Wang offers WIOS voice/data system over twisted-pair wire

Telephone wiring said to allow inexpensive, quick office expansion

By Stanley Gibson

LOWELL, Mass. — Wang Laboratories, Inc. last week expanded its networked office automation offerings by introducing a voice and data system operating over standard twisted-pair telephone wire. The Wang Integrated Office Solution (WIOS) incorporates telephony, office automation and data processing.

The product includes telephone equipment manufactured by Tele-

nova, Inc., a private branch exchange (PBX) manufacturer in which Wang invested last year [CW, Aug. 12]. Wang currently owns about 40% of Telenova, with an option to acquire a majority interest.

With the introduction of the new system, Wang is "not looking to obsolete coax or Wangnet," according to Richard J. Connaughton, vice-president of U.S. sales. A major benefit of WIOS is that because it uses common, unshielded telephone wiring, it will enable users to reorganize and expand their offices inexpensively and quickly, Connaughton said.

An important part of WIOS is the Wang Business Exchange (WBX), a digital PBX with voice and data capa-

bilities based on the Telenova 1 Business Communications System and the Wang VS minicomputer. According to Wang, the WBX allows the exchange of information among personal computers, terminals and computer systems as well as the exchange of voice signaling between office telephones and central office trunks. The product also allows switched access to VS ports; previously, it was only possible to connect a workstation directly to a VS port. The WBX may be used alone or with WIOS, Wang said.

Wang also introduced two new terminals that operate with WIOS, the Wang Station Set (WSS), a microcomputer-based telephone that includes an LCD and the Wang Modular Voice/

Data Terminal, consisting of a Wang 2110 asynchronous terminal and a WSS equipped with a data adaptor device. These terminals or a standard Touch-Tone telephone set can be used to gain access to the system.

Despite the fact that the terminals are connected to the VS computer by twisted-pair wire, which transmits at a rate of 19.2K bit/sec., response rate for word processing is 85% to 90% of the rate for standard direct-connect coaxial cable, according to Wang officials. This rate of performance is achieved by the addition of an "enhanced asynchronous device controller" between the Wang VS computer and the user, the Wang representatives said.

"The obvious positive side is that they are using twisted pair. In the long run, the end users in the office are going to want to be tied together with twisted pair," said Evelyn S. Wilk, senior manager at Arthur Andersen & Co. in Chicago. She said

With Litton Computer Services... PC STANDS FOR PEAK COMMUNICATIONS!

MIS managers have always been faced with a profound problem, that of satisfying all those within their companies who need access to instant information. How can an MIS manager process the regularly-scheduled data on his mainframe and meet the unscheduled demands -- important demands -- of his company's PC users? And how can the problem be solved without draining time, space, and personnel from the mainframe?

It's a problem that's been solved by smart companies whose MIS managers know Litton Computer Services.

LCS, an important part of the \$5-billion Litton Industries, has helped create a firm alliance between the micro and mainframe, enabling the



two to work together in total harmony. And whether your PC's are separated by a corridor or a continent, LCS is ready to provide the same centralized document storage and centralized program storage that American government and industry have received from us for 25 years.

LCS puts time on your side and service at your command, and we support you with mainframe expertise, micro expertise, and a telecommunications system that's second to none.

When you need total information management, when you need to control your data-processing flow with absolute perfection, you need LCS.

Litton Computer Services. We don't simply have the solution, we are the solution.

Contact us now.

For complete information, send back the coupon or call
Litton Computer Services toll free.

1-800-526-2267

in New Jersey, (201) 575-2843

YES, I'm interested in what Litton Computer Services has to offer my company.
☐ Please send me more information. ☐ Please call as soon as possible.

Name _____

Title _____

Company _____

Address _____

City _____

State _____

Zip _____

Business phone _____

CW/S

Mail to: Litton Computer Services, 6 Kingsbridge Road, Fairfield, NJ 07006, Attn: Marketing Dept.

Success is just a matter of time.

Litton
Computer Services

New York
Chicago

Los Angeles
Houston

Washington, D.C.
Philadelphia

"
*'In the long run, the
end users in the
office are going to
want to be tied
together with twisted
pair.'*

— Evelyn S. Wilk
Arthur Andersen & Co.

WIOS appears geared to small businesses and departments of 30 to 80 users who want the benefits of office automation without large initial outlays.

Wilk added that the move to twisted-pair wiring will probably not occur on a large scale until 1990, but "Wang needs to be in on it now so they can develop their own track record. The world is going to twisted pair, rather than heavy-duty cable, at least for the casual user." She also said, however, that the cable will have its place in many applications.

Lee Doyle, an industry analyst for International Data Corp. in Framingham, Mass., likened WIOS to Northern Telecom, Inc.'s Meridian system, introduced a year ago. "This falls into the same class as Meridian," he said, cautioning that immediate success may be difficult to attain. "You've got to sell the phone people and the DP people. I don't think people will be buying in the short term. It's tough to justify. Northern Telecom still must sell the concept," he said.

Initially, the product will be available only in 10 major U.S. markets, three of which are in California: Newport Beach, Century City and San Francisco; Boston, New York, Chicago, Dallas, Atlanta, Washington, D.C. and Cleveland.

Fifteen more U.S. cities will be added in July, and the product will be available in all U.S. markets in nine months, according to Connaughton.

Available immediately, a typical 48-telephone WIOS configuration for a small office, including 16 Wang Station Sets, eight Modular Voice/Data Terminals and the VS 5/WBX combination, costs approximately \$85,000.

NEWS

AT&T Conversant Systems unveils voice recognition model

Scaled-down version serves 32 users at once

By Douglas Barney

BERKELEY HEIGHTS, N.J. — Less than a year after its introduction of Conversant I Model 80, AT&T Conversant Systems, a venture company formed by AT&T, last week introduced a second speech processing product.

The Conversant I Model 32 is a scaled-down version of AT&T Conversant's original product, which served 80 users simultaneously and was aimed at telephone companies and multiple-application service bureaus. The Model 32 serves 32 users simultaneously.

Like the Model 80, the Model 32 accepts input from a Touch-Tone telephone as well as voice input. With the system, users can validate credit cards, access computer data banks and receive automatic stock quota-

tions from the host computer. Because the system has its own hard-disk storage, it can operate without a host when large amounts of storage are not required.

"The system has built into it a computer [AT&T's PC 6300 Plus] that handles the transaction control and some local data base functions. It only needs to go to a host computer if you need to access large data bases," said Dean Hester, head of the Conversant Systems development department for AT&T Bell Laboratories.

Other possible uses include catalog sales, account inquiries and travel reservations, according to Kendra VanderMeulen, president of AT&T Conversant Systems.

The system can understand a variety of voices, accents and dialects without the user having to pause or enunciate carefully. The system's voice recognition and coding processes record information that can be played back through the computer.

Limited to 'yes' and 'no'

Unlike some large vocabulary systems provided by Votan of Fremont, Calif., and Kurzweil Applied Intelligence, Inc. of Waltham, Mass., the Model 32 has a vocabulary that is limited to the words "yes" and "no" and the numbers zero through nine. The system can, however, recognize up to 6,000 combinations of numbers. The user generally calls the computer

data bank and answers questions with a "yes," a "no" or a number.

Both Conversant products were based on technology previously developed by AT&T Bell Laboratories. The products, however, were formally developed and marketed by the Columbus, Ohio-based AT&T Conversant Systems.

The Model 80 costs between \$50,000 and \$100,000 depending on the configuration. The Model 32 costs between \$25,000 and \$50,000 and will be available through AT&T Information Systems or through AT&T value-added resellers. The product will be in beta test by July and widely distributed by September, Hester said.

IRS lacks proper disaster recovery plan, GAO claims

By Mitch Betts

WASHINGTON, D.C. — Fire, accidents, earthquakes or sabotage would cause prolonged disruptions at Internal Revenue Service computer centers because the IRS lacks an adequate disaster recovery plan, according to congressional auditors.

The latest report by the U.S. General Accounting Office (GAO) concluded that IRS contingency plans are incomplete and that the agency is making only slow progress toward a complete DP risk analysis.

The GAO audit said the IRS does not have backup processing sites, has not identified the critical DP work that must be performed first after a disruption and has security lapses such as unlocked doors to computer rooms after business hours.

In an official response, the IRS generally agreed with the GAO's findings and said it plans to improve contingency planning and to complete its risk analysis studies by 1987.

The GAO report added that a good contingency plan would have helped the IRS recover from the disastrous 1985 tax processing season because it would have identified alternative processing sites to cover the shortage of computer capacity at IRS centers.

The IRS disputed this notion, however, stating that contingency plans for natural disasters and sabotage are not applicable to last year's problems, which were associated with the implementation of new systems.

In a return volley, the GAO report stated that the 1985 problems — particularly inadequate computer capacity — were similar to what would happen if a natural disaster knocked out any IRS computers.

"If the IRS had had adequate contingency plans, the process of locating and using additional processing facilities might have been easier," the GAO said.

SAS Institute Inc. Announces

Lattice C Compilers for Your IBM Mainframe

Two years ago...

SAS Institute launched an effort to develop a subset of the SAS® Software System for the IBM Personal Computer. After careful study, we agreed that C was the programming language of choice. And that the Lattice® C compiler offered the quality, speed, and efficiency we needed.

One year ago...

Development had progressed so well that we expanded our efforts to include the entire SAS System on a PC, written in C. And to insure that the language, syntax, and commands would be identical across all operating systems, we decided that all future versions of the SAS System — regardless of hardware — would be derived from the same source code written in C. That meant that we needed a C compiler for IBM 370 mainframes. And it had to be good, since all our software products would depend on it. So we approached Lattice, Inc. and asked if we could implement a version of the Lattice C compiler for IBM mainframes. With Lattice, Inc.'s agreement, development began and progressed rapidly.

Today...

Our efforts are complete—we have a first-rate IBM 370 C compiler. And we are pleased to offer this development tool to you. Now you can write in a single language that is source code compatible with your IBM mainframe and your IBM PC. We have faithfully implemented not only the language, but also the supporting library and environment. Features of the Lattice C compiler for the 370 include:

- Generation of relocatable object code. Relocatability allows many users to share the same code. Relocatability is not an easy feature to achieve on the 370, especially if you use non-constant external variables, but we did it.
- Optimization of the generated code. We know the 370 instruction set and the various 370 operating environments. We have over 100 staff years of assembler language systems experience on our development team.
- Generated code executable in both 24-bit and 31-bit addressing modes. You can run compiled programs above the 16 megabyte line in MVS/CA.
- Generated code identical for OS and CMS operating systems. You can move modules between MVS and CMS without even recompiling.
- Complete libraries. We have implemented all the library routines described by Kernighan and Ritchie (the informal C standard), and all the library

routines supported by Lattice (except operating system dependent routines), plus extensions for dealing with 370 operating environments directly. Especially significant is our byte-addressable Unix-style I/O access method.

- Built-in functions. Many of the traditional string handling functions are available as built-in functions, generating in-line machine code rather than function calls. Your call to move a string can result in just one MVC instruction rather than a function call and a loop.

In addition to mainframe software development, you can also use our new cross-compiler to develop PC software on your IBM mainframe. With our cross-compiler, you can compile Lattice C programs on your mainframe and generate object code ready to download to your PC. With the cross-compiler, we also offer PLINK86™ and PLIB86™ by Phoenix Software Associates Ltd. The Phoenix linker and library management facility can bind several compiled programs on the mainframe and download immediately executable modules to your PC.

Tomorrow...

We believe that the C language offers the SAS System the path to true portability and maintainability. And we believe that other companies will make similar strategic decisions about C. Already, C is taught in most college computer science curriculums, and is replacing older languages in many. And almost every computer introduced to the market now has a C compiler.

C, the language of choice...

C supports structured programming with superior control features for conditionals, iteration, and case selection. C is good for data structures, with its elegant implementation of structures and pointers. C is conducive to portable coding. It is simple to adjust for the size differences of data elements on different machines.

Continuous support...

At SAS Institute, we support all our products. You license them annually; we support them continuously. You get updates at no additional charge. We have a continuing commitment to make our compiler better and better. We have the ultimate incentive—all our software products depend on it.

For more information...

Complete and mail the coupon today. Because we've got the development tool for your tomorrow.



SAS Institute Inc.
SAS Circle, Box 8000
Cary, NC 27511-8000
Telephone (919) 467-8000 x 7000

I want to learn more about:

- ☐ the C compiler for MVS software developers
- ☐ the C compiler for CMS software developers
- ☐ the cross-compiler with PLINK86 and PLIB86

today...so I'll be ready for tomorrow.

Please complete or attach your business card.

Name _____
Title _____
Company _____
Address _____
City _____ State _____ ZIP _____
Telephone _____

Mail to: SAS Institute Inc., Attn: CC, SAS Circle, Box 8000, Cary, NC, USA.
27511-8000. Telephone (919) 467-8000, x 7000

21APR86 CW

NEWS

Start-up firm grabs lead

From page 1

interface with microcomputers and laserwriters or accept microcomputer disks directly, with Postscript as the interface.

By the end of this year, with an installed base estimated at more than 150,000 laser printers and four million IBM Personal Computers and compatibles, corporate users will be ripe for desktop publishing, according to electronic publishing industry observer Jose Ramos of Redwood City, Calif. The result will be "like throwing a match into a room full of gasoline," Ramos adds.

Large corporate accounts were just a growing fraction of the \$117 million desktop publishing market, not including laser printer sales, last year, according to estimates by Ramos, publisher of "WYSIWYG" newsletter in Redwood City, Calif.

He predicts the corporate market will be a larger percentage of the \$240 million desktop publishing market he expects this year and will represent the majority of the market in 1987, when Ramos anticipates as much as 400% growth.

Challenges to Adobe

Adobe is not unchallenged in the page-composition communications market. Analysts expect a contest among Postscript, Xerox Corp.'s Interpress language and the Impress page description language from Imagen Corp. of Santa Clara, Calif., which also produces a document description language that

mixes text and graphics.

Imagen says its document description language is faster than Postscript and offers a binary format option, while Postscript communicates in ASCII characters. But Imagen does not rule out Postscript compatibility someday.

Apple opted for Adobe because of similar philosophies between the firms and a reluctance to go with what Apple saw as a direct competitor such as Xerox, said John Scull, Apple's desktop publishing marketing manager.

Postscript's attraction is its capacity to enable any application using a Postscript driver to communicate with any Postscript-speaking printer, instead of requiring a host of separate printer drivers to handle whatever printer the user might have.

To the user, communications are essentially transparent. Postscript's presence not only increases the options of output devices, it also enables an easy mix of text and graphics in a page layout.

The promise of Postscript technology so intrigued Apple that it bought a 20% share of Adobe as well as choosing Postscript for the Laserwriter. Despite Apple's major role in Adobe's development, the company's co-founders still retain control, and Adobe has actively pursued deals with other major hardware vendors that are potential Apple competitors.

Other companies licensing Postscript for use in their printer controllers include Wang Laboratories, Inc. and Digital Equipment Corp. among more than 20 others in 1985.

Postscript's appeal is not limited to major hardware

players. Smaller, local developers are exploring Postscript's potential as a complete programming language. Adobe sponsors classes in Postscript and has written two text manuals, *Postscript Language Reference Manual* and *Postscript Language Tutorial and Cookbook*, published by Addison-Wesley Publishing Co.

Sales have been hot at Computer Literacy Bookstore, Silicon Valley's high-tech-only book seller in Sunnyvale, Calif., says store co-owner Rachel Unkefer.

A big factor in the growth

77

Postscript's appeal is not limited to major hardware players. Smaller, local developers are exploring Postscript's potential as a complete programming language.

of corporate desktop publishing will be the appearance of page layout programs for IBM PC and compatible systems, which outnumber the Macintosh in corporations.

But such is Postscript's dominance that MS-DOS publishing systems are also including a Postscript driver. Aldus Corp. is building Postscript into its upcoming DOS version.

Even Ventura Software, which recently licensed Xerox Corp. to distribute its Ventura Publisher systems, plans to support both Postscript and Xerox's Interpress in the version due out in June, says John Meyer, Ventura Software president.

IBM's only desktop publishing activity has been at the high end of microcomputing. Its reduced instruction set computer-based RT PC, introduced early this year [CW, Jan. 27], was accompanied by the release of Workstation Publishing Software based on Interleaf, Inc.'s Technical Publishing Software.

The other significant hardware holdout is Hewlett-Packard, which uses its own Page Composition Language (PLC) on its Laserjet and Laserjet Plus. Unlike Postscript, PLC is not a programming language but an instruction set suited to text and capable of handling mixed graphics and text.

Adobe representatives say Adobe and HP are negotiating for Postscript use, but HP is noncommittal.

"We do realize we need to integrate a page-description capability," says Cathy Lyons, independent third-party market development manager of HP's Boise, Idaho, divi-

sion. But she says HP may include page-description-like features in the next level of PCL.

Adobe expects Postscript soon to grow beyond the microcomputer arena and into high-end electronic publishing.

"We view Postscript as a page-description language that extends up through the graphics arts industry," says cofounder Geschke. Aiming for the high end of electronic publishing also means moving outside Apple's market.

"Apple is our biggest shipping customer, but I think [Adobe's] trend will be to rely less and less on Apple," Warnock says.

Options within desktop publishing and Postscript itself keep Adobe busy enough that it will likely remain a single-product firm for some time, company officials say. Adobe is constantly adding to Postscript's selection of typeface families, which now numbers about 50.

Beyond Apple's scope of activity, Adobe is developing techniques for reproducing half-tone, or screened, photographs, which are a series of dots currently limited by printer quality. The Laserwriter handles the equivalent of a 60-line screen; standard newspaper photographs are reproduced in 80- to 100-line screens.

Still, many professional typographers say current laser printer output with Postscript is only good enough for drafts, not the final product.

"The text is still a little fuzzy around the edges," says Tom Rohan, a printer worker with Interstate Press of Portland, Ore. "It's not typeset quality yet. But once laser printers can increase

the dots per inch, it will give typesetters some real competition." Compared with a typical laser printer output of 300 dot/in., typeset quality is considered a minimum of 1,000 dot/in.

Adobe points to two new Linotronic typesetters with Postscript that produce more than 2,000 dot/in. Linotronic's competition, Compugraphic Corp. typesetters, have adopted Interpress instead, keeping the race steady.

Micro users major players

Analysts say the largest part of the desktop publishing market consists of microcomputer users who are discovering their machines' publishing capabilities.

"Adobe has a tremendous lead, and barring a major aggressive push by Xerox [Interpress] and market changes in general, Postscript will become the de facto standard for the general business market," says Tim Bajarin, analyst with Creative Strategies of San Jose, Calif.

He does not dismiss Interpress, which tends to be faster than Postscript, but suspects Adobe will capture the microcomputer market while Xerox aims for the high end of electronic publishing.

Postscript's role is best played in the desktop systems, where its graphics are appreciated and speed is less an issue, says Jeff Tarter, editor of the newsletter "Softletter," published in Cambridge, Mass.

"Electronic publishing is the equivalent of mainframe work," Tarter says. "Daily newspapers or catalog publishers aren't going to be interested in all the fancy features of Postscript when they need speed instead."

BUILDING A COMPUTER CENTER?

If you're planning a new, expanded or remodeled DP facility, you need Datasphere's help.

Since 1968 Datasphere's unique combination of services has saved dollars, frustration and time for large and small firms around the world.

From turnkey—design/build computer rooms to consultation on the smallest project, we'll do all or part—on schedule, within budget! Datasphere is unique—we're engineers, consultants, planners and builders specializing in computer facilities.

Datasphere's engineers are expert in all computer support systems including:

- Uninterruptible Power Systems
- Computer Power Centers
- Computer Fire Protection Systems
- Computer Type Air Conditioning
- Gas Turbines/Diesel Generators
- Operation Command Centers
- Elevated Flooring
- Frequency Converters
- Line Filters
- Security Systems
- Systems Monitors
- Voltage Regulators

CALL DATASPHERE

800-221-0575

IN NEW JERSEY CALL: 201-382-2300

datasphere, Inc. 1255 Westfield Avenue, Clark, New Jersey 07066

DEC RENT, BUY, UPGRADE OR SELL

NEW AND USED DEC® SYSTEMS & ADD-ONS

- Excellent Product Quality & Equipment Pricing
- Extensive VAX® & PDP-11® Inventory

New 1986 Catalog
Now Available



BROOKVALE ASSOCIATES...Our 12th Year

YOUR BEST SOURCE FOR VAX & PDP-11 PRODUCTS

WEST COAST: 800-252-6200

IN WA STATE: 206-881-2929

IN WA STATE: 206-881-2929

EAST COAST: 800-645-1167

IN NY STATE: 516-273-7777

IN NY STATE: 516-273-7777

TW: 510-228-7319

DEC, VAX & PDP-11 are registered trademarks of Digital Equipment Corp.

NEWS

MSA users give high marks, few dollars, to Information Expert

Firm uses product as strategic tool

By Charles Babcock
and James Martin

LAS VEGAS — Users of Management Science America, Inc.'s (MSA) applications last week raved about the fourth-generation reporting feature introduced by the company last year. But that has apparently not translated into a big revenue source.

At Interact, the MSA users group meeting held last week, users offered good grades for MSA's Information Expert series, introduced last June. The series integrates MSA applications through a shared data dictionary and offers customers a fourth-generation reporting feature, Expert Reporter.

MSA claims Information Expert is in the hands of 2,000 customers, making it the "most widely used fourth-generation technology." In fact, the report writing component has been given to any MSA application customer who qualified for an update, and few have been inclined to buy the \$50,000 license that broadens the report writer's interface to go into internally developed or competing vendors' applications. MSA says the 125 licenses that they have sold are more than they anticipated in the first two years of the product, which they say took five years and \$20 million to develop.

Douglas MacIntyre, vice-president for sales, said that despite the heavy investment, MSA was willing to give the report writing segment away as a "strategic product."

When the Reporter's data dictionary is added as a front end to an MSA application, a user may access any standard IBM file and data base management system as well as independents' products, such as Datacom/DB from Applied Data Research, Inc. and IDMS from Cullinet Software, Inc. At the same time, data can be retrieved through the report writing interface from other MSA applications and, with the purchase of a \$50,000 permit, from competing vendors' applications.

'Playing with the same deck'

Information Expert "is superior to any report writing system on the market. It's nice to have everyone playing with the same deck," said George E. Folger Jr., manager of systems development for Jeppesen Sanderson, Inc. in Englewood, Colo.

"I would say Information Expert is a product that opens up a lot of doors for MSA," said Ronald J. Beck, vice-president of the Bank of New York and president of the Interact group.

"MSA has put a lot of pressure on other software vendors at this point," agreed Richard L. Lippincott, assistant manager, systems and programming, for Geisinger System Services, a health care firm in Danville, Pa.

Once customers get accustomed to the capabilities of the report writer, they will be more inclined to buy more MSA applications that can be accessed by it, MacIntyre said. In addition, they may be inclined to buy the Expert Language segment or the screen painting facility once the latter is available in November, he said.

Some users were skeptical that the "expert system components" of Information Expert would live up to a standard definition of expert systems. But even users who had stumbled over shortcomings of the system had praise for it.

Ronald Kaput, manager of systems and programming at CF Industries, Inc. in Long Grove, Ill., said his development staff experienced disastrous miscues when they attempted to use Expert Reporter to create on-line reports from diverse applications. The relational-type pointers would malfunction, and "all of a sudden we would wind up in the middle of an old report. It would bring my production system down cold." Kaput neverthe-

less described Expert Reporter as a "fantastic product."

MSA Executive Vice-President Dennis V. Vohs said the miscue could occur if users attempted to get the Expert Reporter to do things limited to the custom-reporting features of the Expert Language. When Kaput cited his experience at a conference session, however, MSA told him that the malfunction occurred because of "a logic error" that was being corrected in the next release.

Users at the meeting said they will keep buying MSA applications even though MSA offers no data base management system as an umbrella for its products as does Cullinet Software. But that commitment was con-

tingent on MSA's continued willingness to interface its applications with multiple data bases.

"I think Cullinet Software is winning sales on the basis of claims that its applications run best with its data base," noted Mason Davis, of Zachman Davis Computer Services, Inc., Atlanta, a firm that serves MSA application users. But MSA's ability to interface its applications to varied data bases makes it "a matter of which pitch you believe," Davis said.

Also viewed as a big plus was MSA's willingness to convert its applications to run under IBM's relational data base management system, DB2, a step Cullinet has said it does not intend to take.



HOW TO GET AN ELEPHANT INTO YOUR PC.

NOW, LOADING TEXT AND IMAGES INTO PC'S IS AS EASY AS MAKING A COPY.

After years of research, Datacopy has developed a unique range of solutions to one mammoth problem: how to copy stacks of text or images into PC's fast, and be able to manipulate the material with best-selling word processing, graphics, and computer aided design software.

As proven market leaders, our systems are making a big contribution to office productivity. From small businesses to national institutions, Datacopiers are helping store documents, publish newsletters, and handle a wide variety of optical character recognition and data processing tasks.



Is your work stacked as high as an elephant's eye?

use: for example, the newest Datacopier has a unique automatic page loading capability.

Our *Imagination Series* software interfaces with an unbeatable selection of top programs like Wordstar, Lotus 123, and AutoCAD, and can even be trained to read and file your business mail, no matter what the typeface.

DATACOPERS: THERE'S NOTHING LIKE THEM.

Only Datacopiers can accommodate text, drawings, pictures, pages, books, and even objects. Our systems are exceptionally easy to

IMPRESSIVE RETURN ON INVESTMENT

With prices starting at under \$3,000, *any* business with word processing, publishing, or design activities should have a Datacopier. It will pay for itself in saved time in no time.

For further information, and the name of your nearest dealer, please call:

1-800-556-1234 (Inside CA call 1-800-441-2345) and ask for extension 96.



DATACOPY

Nobody sells more scanners.

VIEWPOINT

EDITORIAL

Time out on the level playing field

The most recent scrimmage of the post-divestiture level-playing-field competition has seen a key player, Pacific Bell, seem to abandon its team and go over to the other side. Pacific Bell last week enlisted with IBM and Tymnet/McDonnell Douglas Network Systems Co. to help the Federal Communications Commission out of the dilemma of finding a way to permit the divested Bell operating companies to offer enhanced services (protocol conversion and voice mail, for example) without allowing their monopoly on local service to essentially close out all competition — a concept the FCC has labeled Comparably Efficient Interconnection or CEI.

The Pacific Bell/IBM/Tymnet solution: Make the divested Bell operating companies (including Pacific Bell) promise that, when enhanced services are offered, their competitors will be able to take advantage of the same price breaks and interconnection efficiencies offered to their customers.

Now, why would one operating company, Pacific Bell, suddenly propose an FCC ruling that would provide a marked leg up to its potential competitors? Perhaps Pacific Bell figures that it can never gain the upper hand over enhanced-service vendors like Tymnet and that it will gain more customers in the long run by acting as transport to such providers. Or it may believe it is simply bowing to the inevitable by supporting some form of CEI.

Whatever the reasons (and Pacific Bell officials are mum on the subject), it's a fair bet that the FCC, Tymnet and other enhanced-service providers will applaud the move as a wonderfully generous gesture of fair play — to which users should say, "Time out!"

The whole design behind divestiture was to make the communications market more competitive, creating better services, increased options and a few price breaks for consumers. If now the Bell operating companies are compelled to adjust the costs of interconnecting their customers with those of competitive services every time the operating companies find a way to lower their own costs, where is the incentive for cost control? And, where are the price breaks for users?

The Pacific Bell/IBM/Tymnet proposal would also allow the Bell operating companies to add value (such as packetizing and protocol conversion) only to services offered to users within their own regions, not to the connections they provide between those users and long-distance service providers like Tymnet — who, of course, prefer to do the enhancement themselves. This simply encourages companies to bypass their local telephone company and build their own dedicated bypass connections to long-distance carriers. And, in the long run, users are again deprived of the potential price breaks, flexible rates and services the Bell operating companies might offer local customers.

Granted, so strange and wonderful is the sight of vendor cooperation in the fractured, fractious communications industry that one feels almost obliged initially to look favorably upon the Pacific Bell/IBM/Tymnet action. But closer inspection discloses yet another attempt to undermine the free and open competition mandated by the 1984 Consent Decree, competition that will in the long run benefit users far more than will ill-conceived restrictions on the regionals.



LETTERS TO THE EDITOR

Setting Software AG's line straight

Two letters to the editor, "Software AG chairman has pie-in-sky hopes for Adabas, Natural products" [CW, March 17], show ignorance about Software AG of North America, Inc.'s Adabas and Natural.

The first letter's statement that "Adabas is an excellent network data base management system" shows that the writer either does not know what a network DBMS is or knows little about Adabas. I do not recall Software AG referring to Adabas as a "relational data base" but as a "relational-like DBMS."

Like Oracle Corp.'s Oracle, Adabas requires an index structure to be able to retrieve data from the flat files. Adabas must be included in the list of next-generation data base management systems if IBM's DB2 and Oracle are included.

As far as the second letter's challenge that Software AG's Natural is not a Cobol replacement, Natural is the primary programming language of hundreds of Adabas/Natural installations.

Natural is a very powerful fourth-generation-language solution to reduce development time.

Leo Webb
Data base administrator
Smitty's Super Valu, Inc.
Phoenix

Chip industry is best governed least

I applaud your editorial, "War of the chips: Vendors vs. users" [CW, March 24], opposing U.S. government intervention in the international semiconductor market.

It would certainly be a shame to see our dynamic semiconductor industry become as stagnant and out of date as our other industries that have received government protection from competition: steel, ship building, textiles, shoes and autos, for example.

And, as you say, government can best help business by doing less. Lower government spending will reduce interest rates, which will stimulate business investment.

Another stimulus for investment would be to change our tax code so that dividends are not taxed twice and so that capital gains are taxed only if they are not due to inflation.

J.D. Gay Prewitt
Lexington, Ky.

System/38 deserves recognition

I am frequently astonished at the absence of any mention of the IBM System/38 in the trade press but usually attribute it to a lack of expertise on the part of the journalist in categorizing this innovative computer. (A friend recently joked that the biggest problem with the System/38 is that it is not IBM compatible.) When an article entitled "Mini DBMS mart growing" [CW, March 31] and its associated product chart completely ignore what I and many of my associates consider the best all-around DBMS and general business computer system in the world, I must take exception.

This incredible system has been around for over six years, more than enough time for the prophets of the leading edge to recognize a good thing. Having endured over a decade of babysitting IBM mainframes mired in a dozen levels of software with roots closely tied to their 360 parents, it was almost a catharsis for me when I had the opportunity to begin working as an analyst/programmer on the System/38.

The tools that this system provides to the system developer are without equal in the business, and the user-friendly, single level of operating software that is the first offering from IBM to be developed for a truly interactive (not batch) environment provides the data processor with the freedom to try new, more effective approaches to solving the information needs of his company. Staffing requirements, as well as hardware and software costs, are reduced to a level that put this system within reach of even a modest-size organization. And finally, the data base management system that is an integral part of the operating system has as much right to call itself relational as any other on the market.

My hyperbole will no doubt surprise those who have not had the pleasure of working on this amazing machine, but the fortunate System/38 veterans out there will certainly understand. What is not understandable, though, is the reticence on the part of the data processing establishment to give this innovative system its deserved recognition. With IBM constantly expanding the high end of the System/38 line, maybe some day it will take up enough computer room floor space and require enough system programmers to be recognized as a legitimate IBM computer system.

Donnie W. Collins
Agrico Mining Co.
Lakeland, Fla.

VIEWPOINT

When management calls a tune professionals won't play

By HOWARD KARTEN

Some of the testimony before the space shuttle *Challenger* inquiry board puts a spotlight on an old conflict that's especially pertinent to the DP community: the tension between employees such as programmers, who have technical skills, and the goals and methods of the managements who employ technical experts. In today's fiercely competitive business environment, it is appropriate to ask, "What are the responsibilities or obligations of professionals when management pays for their skills (which, presumably, includes their judgment) but ignores advice that runs counter to management's goals and timetables?"

Here are three real-life cases illustrating some of the serious ethical conflicts that can face DP personnel:

• Systems programmer Harold worked in a shop running an on-line financial system. At 10 a.m. one morning, he discovered that a freak error had changed one byte in the on-line system. The program was running at that time and would remain in operation until 8 p.m. that evening.

He presented management with two options for correcting the error. The "approved," somewhat lengthy way was to reassemble the faulty program module, relink the program, put it back in the library, halt the version of the on-line program and restart the corrected program. It would have taken at least four hours to accomplish this, and during that time there was considerable risk of scrambling critical files.

The quick-and-dirty solution — the one that would probably be prohibited by a canon of professional conduct — would be to halt the system for 20 seconds, insert the correct code into memory manually (through the console), start the system up again and make the change properly at night. Choice No. 2 gets the program corrected sooner but, because it leaves no audit trail, is almost a textbook formula for what's delicately called "financial irregularity." Harold had fully absorbed the culture and values of his department, which emphasized a high degree of integrity and "approved fiduciary behavior" when dealing with money, so he faced a serious ethical dilemma.

• Jim, a civilian programmer employed by the U.S. Department of Defense, was told that his program analyzing and presenting data from a weapons system test should be written in a particular way. Jim, wise in the political ways of bureaucracies, strongly suspected that the reason was to allow some mild cooking of the data. He also was aware of the fates of others who had bucked management and how meager were the

protections afforded by civil service.

• Sam, a programmer for a retail chain, was told to write a program so that if an account had a credit balance but no activity during the past month, no statement would be sent to the customer. Sam felt this was not entirely fair to customers.

Part of the ethical problem comes from the fact that the three programmers were on the employer's payroll. If you're on a payroll, it can take an

enormous amount of courage to stand up and say, "Hold it" to ac-

tions that you believe might violate your responsibilities as a professional. Clearly, dissenting in such a case can put your job at risk. In the three cases above the programmers acceded to management's wishes.

If Jim, Sam and Harold had not been on a payroll but instead had been on retainer (that is, employed by a third party), they might have had greater freedom of action and influence with management. For example, if they felt strongly enough that management's wishes conflicted with their obligations as professionals, one option would be to ask to be removed from the account.

Under the Piper's Pay Principle (he who pays the piper calls the tune), any employer is justified in saying, "You've explained my options and probable outcomes, and I've told you what I want. It's not illegal, so stifle and do it my way or get off my payroll." In general, professional pipers are obligated to follow client instructions. Two exceptions are if the client requests something clearly illegal or if the professional feels that he would not be able to work wholeheartedly due to strong feelings that the client's proposed course of action would be ineffective, destructive or injurious to the client.

Our industry has seen periodic calls for professional status for DP personnel, which is probably a noble goal. But because most depend on one employer for their income, the idea of professional status is probably a pipe dream at best. Management more often seeks team players than professionals who value independence.

The entire issue of ethics and professional status for on-payroll experts is complex and deserves additional discussion by the entire DP community. One answer is undoubtedly for DP professionals to add persuasion abilities to their other technical skills so that when management asks for an opinion, they can provide it with greater credibility. Perhaps we would see less vaporware, for example, if DP personnel could achieve greater influence with management. Who knows what this might do to lower the burnout and bankruptcy rates in the industry, to name just two areas?

In the meantime, it's instructive to ponder some provocative words on the subject written more than 80 years ago by playwright George Bernard Shaw: "All professions are a fraud upon the laity."

Diagnosis: Epidemic overspending in IBM shops

No easy cure for getting more out of mainframes

By EFREM G. MALLACH

Will Zachman of industry watcher International Data Corp. recently estimated that "IBM customers spend \$3.5 billion to \$4 billion per year more than they have to on IBM mainframes." By any standard short of the national debt, this is a substantial amount of money.

To understand this number we must place it in perspective. Total

user spending on IBM mainframes is about \$15 billion per year. If Zachman's figure is correct, the typical IBM mainframe user organization is spending about 30% to 35% more on these systems than it has to. This figure is an average of several different user categories:

- Users who are doing perfectly. Potential savings: zero. Cost to obtain these savings: none.
- Users who should save by tuning their system. Potential savings: about 5%. Cost: \$10,000 to \$50,000.
- Users who should save by using plug-compatible equipment. Potential savings: 5% to 10%. Cost: administrative effort, switchover time plus possible emotional difficulties from leaving the comfort of the Big Blue security blanket.
- Users who should save via converting to another mainframe architecture. Potential savings: 20% if the workload is atypical and a different hardware-software combination fits it better; otherwise the same 5% to 10% as with plug-compatible manufacturers (PCMs). Cost: all those above, plus a large software conversion task.
- Users who should save by converting to superminis. Potential savings: 30% to 50% through the IBM 3083 level but less for larger IBM systems because they must be replaced by multiple systems, networks, clusters or similar. Cost: same as above. The extra ongoing effort to deal with system software that does not offer all the functionality of mainframe products will be offset by generally simpler system procedures, user interfaces, utilities and the like.
- Users who should save via converting to multiple supermicros. Potential savings: 50% to 75%. Cost: enormous because the basic tools for serious large-scale work are not

there. (A few recent products, such as the Enmasse Computer Corp. system, are changing this picture.)

The moral here, unfortunately, is that there's no free lunch.

The easy moves don't get you nearly 30%. That doesn't mean you should stay put: 5% or 10% of a few million is still worth shooting for. Managers in most areas other than computing would give their eyeteeth for 5%.

The 30%+ moves, on the other hand, aren't easy or cheap. The average 3083 staff can't build and install a network of multiuser micros any more than it can sprout wings and fly. Even the supermini route would

be traumatic. The current staff would see all their hard-won CICS and JCL skills becoming useless. If everyone went to minicomputers, there wouldn't be enough VAX, Eclipse or DPS 6 programmers to go around.

It follows that IBM will have

most of its multibillion-dollar bonanza around for a while because \$4 billion is less than it would cost users to save \$4 billion.

As technology keeps PCMs, minis and micros moving ahead, IBM's prices will stay just close enough to keep users from switching to these alternatives in volume. This strategy has worked for a long time. Today's micros change the specifics but not the principle.

Fortunately, Mr. or Ms. DP Manager, you are not helpless. You are not a captive. You have options. It just takes a little forward planning to make the short-run constraints go away. You should take these actions:

• Keep apprised of industry trends and your options. Your mainframe vendor's sales representative may or may not be helpful, depending on what other products the firm offers.

• Look for ways to try alternatives. New applications, new corporate divisions and the like are all possible opportunities to apply new, cost-effective technologies. Your mainframe vendor has a vested interest in your continuing to do things the way you have always done them. This may not be in your best interest.

• Develop a plan for where you want your installation to be in five years. Major changes, changes that may be too big to contemplate if they are seen for the first time at close range, are easier to justify and implement as part of a long-range plan.

• Above all, remember who's in charge. You are, not your vendor's sales representative. It is your responsibility, not your mainframe vendor's, to provide your employer with cost-effective information services. If you are calmly paying Zachman's 30% premium with no plans to do anything about it, you are not fulfilling this responsibility.

MANAGEMENT MATRIX

The average 3083 staff can't build and install a network of multiuser micros any more than it can sprout wings and fly.

Now a writer and consultant, Karten has been involved with computers for two decades as a programmer, systems analyst and DP manager.

Mallach is associate professor of computer science at the Boston College School of Management and a consultant to top managers of vendor and user organizations.

VIEWPOINT



TURNAROUND TIME

Larry Long

Q I'm a systems programmer in the area of systems performance and tuning. I have decided that my talents could be better used elsewhere. My problem is finding an organization that is looking for someone

with my qualifications. I'm receiving newspapers from cities I'd like to live in, but it seems that large organizations looking for systems people do not place ads in the paper.

I've also tried finding a new opportunity through headhunters but have been unsuccessful.

Is there any way for people that don't write Cobol or Basic for a living to further their careers?

Placement agencies pro-

vide a valuable service, but they are certainly not the only solution. If your systems programming experience is with state-of-the-art hardware and software, you should be able to work anywhere you want. Companies everywhere, especially large companies, are forever looking for qualified systems programmers. Select the area or areas of the country in which you wish to live, and then select particular cities. Write to each city's Chamber of Com-

merce and request a membership list.

If you are adamant about limiting your search to large companies, pick only those companies with 700 or more employees. Be advised, though, that smaller companies need good systems programmers also. Some small organizations are far more sophisticated in their application of computer technology than some Fortune 500 companies.

Call the personnel depart-

ments of those companies that interest you and ask to speak with someone who deals specifically with employment in computer-related areas.

Request the appropriate paperwork and correspond directly with this individual. "Dear Sir" letters get considerably less attention than those addressed to a particular individual.

Another way to get attention is to place a notice in the "position wanted" section of the classified ads. The "desperate" stigma long associated with this section no longer applies. Many career-oriented people in the computer fields find the "position wanted" section a convenient and anonymous way to advertise their desire for alternative employment.

Complexity Unraveled



Introducing a powerful new version of the most widely used decision support software in the world: EXECUCOM's IFPS/Plus.

IFPS/Plus has been helping people successfully unravel complex business problems for over a decade. That's why today, IFPS/Plus is the most popular decision support software among Fortune 500 companies.

There's a clear reason behind its success. IFPS/Plus comes from EXECUCOM, the originator, innovator and leader in the field of Decision Support Technology. So it's designed from experience no one else can match.

IFPS/Plus incorporates standard business terminology so users can build realistic models of everyday business problems. With features like What If?, Goal Seeking, Sensitivity and Risk Analysis, and Consolidation, it allows users to weigh a range of alternatives. Without massive support from you and your staff.

IFPS/Plus runs on micros, minis and mainframes. It's available for more than 20 environments, running across multiple hardware and software boundaries and allowing data to be shared and analyzed throughout all levels of your organization.

IFPS/Plus is a total, integrated solution to your company's decision making needs.

So it's not mere coincidence that IFPS/Plus is used by America's top corporations, including over 150 financial service institutions, all major U.S. automobile manufacturers, 100 leading oil & gas companies, the "Big Eight" accounting firms, and companies of all sizes in communications, transportation and utilities. They've been making better decisions for years with the help of EXECUCOM and IFPS/Plus.

Of course, IFPS/Plus includes comprehensive training for users, full documentation, "Hot Line" service and complete support. It's a package you'll only get from EXECUCOM, the leader in corporate decision support.

If you're not unraveling your business problems with IFPS/Plus yet, let us tell you why you should be. Give us a call at 1-800-531-5038 (in Texas, 512-346-4980, in Canada, 1-800-558-1390). Or write EXECUCOM Systems Corporation, 9442 Capital of Texas Highway, North, Arboretum Plaza One, Austin, Texas 78759.

EXECUCOM

Q The computer revolution is grinding to a halt in our company. Three years ago our data processing division was favored with the highest budget increase. Management seemed to be satisfied with what we did with the money, but yesterday I was asked to cut my budget for next year. Other department managers were told to expect modest increases.

User demands for our services are greater than ever. The proposed budget will force us to eliminate certain existing services at a time when we should be expanding.

Do you have any arguments that might convince management to reconsider its request?

The budgetary process is a series of negotiations that ultimately yields the optimum allocation of funds for the good of the company.

All you can do at this point is present a well-defined case for getting the level of funding necessary to service the data processing and information needs of your company. Identify in writing those services that will be adversely affected by the cut. If your case is rejected and you haven't already done so, implement a chargeback system.

Any company that is large enough to have department managers should have some kind of chargeback system for computer service. A good chargeback system will result in more efficient use of computing resources and a more realistic allocation of funds.

Long, president of Long and Associates, is a consultant, lecturer and author in the field of information services. If you have a question you'd like him to address, send it to Larry Long, Editorial Department, Computerworld, P.O. Box 9171, Framingham, Mass. 01701-9171.

SYSTEMS & PERIPHERALS



HARD TALK
Charles F. Bender

The revolution in processing

A revolution is in the works. Since the beginning of machine computation, traditional computers have been based on von Neumann architectures and scalar processing.

Now, machines have been developed that offer users the option of vector or parallel processing methods. Vector processors are particularly useful in a computationally intensive environment. They are a standard feature in most of the supercomputers on the market today.

The future impact of vector processing can be more clearly evaluated if one considers the recent entry of IBM into the vector processing market with its 3090.

Parallel processors are in a more experimental stage, but they show even more promise for the future. While vector processors are ideal for number crunching, parallel processors seem to be ideal for symbolic, noncomputational problems like natural language processing.

Vector and parallel processing, added to the traditional scalar approach to computing, open the door to a new generation of mainframes.

In the past, many an interesting computational problem had to be restricted, modified or dissected to make it fit the computer. A variety of complex algorithms were created to permit the computer to solve computationally intensive problems in ways that are instinctively unnatural. One example is algorithms that are constructed for extracting the lowest eigenvalue of matrices that cannot be accommodated in memory.

Today, a new generation of computers offers the option of taking a more
See **REVOLUTION** page 23

Bender is director of the Advanced Computational Methods Center at the University of Georgia in Athens, Ga.

Shearson adopts IBM 3295

Plasma terminal accesses four information services

By Alan Alper

NEW YORK — When Shearson Lehman Brothers, Inc. sought last fall to provide its over-the-counter (OTC) traders with the ability to display simultaneously data from disparate financial information services on a single workstation, there appeared to be few alternatives.

It was painfully obvious to Shearson officials that there was not enough room on each trader's desk to accommodate the four terminals required to access financial information services, an IBM Personal Computer or IBM 3270-type terminal to interact with the corporate mainframe and the oversize telephone needed in the fast-paced world of stock trading.

No product seemed to allow access from a single workstation to the four financial information services to which Shearson subscribes, including Quotron Systems, Inc.'s Quotron. Shearson therefore needed to modify existing technology to develop its own workstation.

Making matters more difficult, the firm wanted the workstation developed before its OTC traders moved in February from the World Trade Center to the new corporate headquarters of its parent company, American Express Co.

"We felt it was important to give the traders the most sophisticated tools possible to do their jobs," recalls Ed Miller, an assistant vice-president at Shearson. "We also knew we had a small amount of time to work with."

Shearson considered a network of IBM 3270/Personal Computer XT's to access the
See **SHEARSON** page 24

NEW THIS WEEK

■ Term Tronics offers its M-179 color display terminal

■ For more on this and other new products, see pp. 87-108.

INSTANT ANALYSIS

"When IBM decided which systems would live and which would die, one of the first criteria was the installed base, and the 8100 and the System/38 clearly fell short in that area."

— International Data Corp. analyst Frank Gons on IBM's announcement that the 8100 would receive no future hardware enhancements

Sperry introduces disk subsystem

By James Connolly

BLUE BELL, Pa. — Adding its second thin-film disk subsystem for mainframe-class systems in six weeks, Sperry Corp. last week introduced a 5.5G-byte magnetic disk system with cache and solid-state disk capabilities.

The Model 5090/8490 subsystem, manufactured for Sperry by Amperif, was preceded in March by the Sperry 5057/8481, which company officials noted provides less disk capacity but a higher performance cache.

Sperry officials said a single 5090/8490 cabinet occupies only 12.1 sq ft of floor space while holding up to 5.5G bytes of formatted disk storage, dual controllers, 32M bytes of cache memory and 40M bytes of solid-state storage. Another 5.5G bytes of disk storage can be added in a 6½ sq-ft expansion cabinet.

A 5G-byte 5090/8490, available in June, costs \$296,500 or can be leased for five years at \$8,236 per month. The same subsystem with 8M bytes of cache costs \$366,500.

Laser lab glows over new Cyber/180 990

By James Connolly

MINNEAPOLIS — With one system installed already, Control Data Corp. plans to begin soon volume shipments of its Cyber/180 990, the high-end product in the 2-year-old Cyber/180 family.

Company officials say they expect to ship 50 990s, with performance ratings of 42 million instructions per second with vector utilization for a uniprocessor and 63 MIPS for a dual processor.

While the user of the first installed 990 declined to discuss the system, another early customer reports that the CDC sys-

tem bests other mainframe systems in benchmarks with near-supercomputer performance. That customer, with a 990 delivery scheduled for July, is the Laboratory Laser Energetics at the University of Rochester in Rochester, N.Y.

"It was the best machine for our scientific purposes. Not only have we had a long-standing relationship with Control Data, but we had benchmarks in a competitive-bid situation involving about seven vendors. In terms of cost-effectiveness and in terms of speed, the 990 was the best for
See **CYBER** page 23

Get your next VT220 Terminal from DJC and save.

As one of DIGITAL's largest Authorized Terminals Distributors, DJC offers the full range of popular DIGITAL quality terminal products. Right now order your VT220's at competitive prices and unbeatable delivery. Call DJC now TOLL FREE. 800 566-1234, ext. 235. In California, 800 441-2345, ext. 235

CHICAGO (312) 629-0300
LOS ANGELES (213) 410-9250
NEW YORK/NEW JERSEY (201) 562-1130
ORANGE COUNTY (714) 250-9402
ORLANDO (305) 629-1595

SAN FRANCISCO (415) 254-9550
WASHINGTON D.C. (301) 995-6060

DJC

The David Jamison Carlyle Corporation
A LEX COMPANY

digital

Achieve Full Integration For Your Corporate PC... With The SAS® System Under PC DOS.

One Integrated Solution For All Your Company Needs.

Now, you can have an information system that offers solutions for all of your company's needs. Data management and retrieval. Statistical analyses. Report writing. Applications development. And

more. All in one product.

And you can use it in every department and for every application. Data entry. Business reports. Text processing. Statistical summaries. With the PC SAS® System, decision-making, record-keeping, and analysis are standard and simple.

One Solution With Complete And Powerful Features.

The same high-quality software for mainframes and minicomputers is now available for PCs. And it offers features as rich as any mainframe system you've seen. A data manager. A full-screen text editor.



BASE II and dBASE III are trademarks of Ashton-Tate. Lotus and 1-2-3 are trademarks of Lotus Development Corporation.

A windowing facility. Complete data manipulation and statistical procedures. A display manager (to edit, display and control output from your PC). An interactive programming facility. A front-end menuing system that you can customize. With the PC SAS System, you get the power of the mainframe and minicomputer SAS System. And more.

One Solution For Your Micro-To-Mainframe Link.

Now, you can link your PC to your mainframe. With the same system at both ends of the link. You can download data to your PC. Or develop and test applications on your PC. The PC SAS System reads data from programs like dBASE II, dBASE III and LOTUS 1-2-3. You can enter data on your PC, submit your job to the mainframe, execute it, and view the results on your PC. Or you can download data from the mainframe, add and

revise, and send the new data to the mainframe for job execution or storage. Regardless of which system you use, the language, syntax and commands are identical.

One Solution That Is Remarkably Friendly.

Now, one system offers special features like programmable "pop-up" windows that make "friendly" a term you can understand. Use these windows to program function keys. To create "help" messages. To check the variables in your data set. And these windows can handle practically any utility you need. In fact, the PC SAS System is so friendly anyone in your organization can use it.

One Solution With Site Licensing And Full Support.

At last, you can have the information system for your PC you've always wanted. With the advantages of site licensing. You

license the PC SAS System on an annual basis. You get all updates automatically. And at no additional cost.

The PC SAS System is also fully supported. Documentation accompanies delivery. Technical support is provided by phone or mail. Full customer training is offered. And it's all available from SAS Institute.

The Solution For SAS Power On Your Corporate PC. Now.



SAS Institute Inc.
Box 8000, SAS Circle
Cary, North Carolina 27511-8000
Telephone: (919) 467-8000, ext. 280
Telex: 802505 SAS RAL



**IN 1972,
WE DECIDED CHROMIUM DIOXIDE
WAS THE PERFECT MAGNETIC MEDIUM.
IN 1985, IBM AGREED.**

In 1985, IBM announced the new 3480 drive that gave us the first dramatic change in computer tape media in thirty years. But the incredible performance of this new tape... six times the recording density of conventional reel-to-reel tape... depends on the latest Chromium Dioxide (CrO_2) particle technology. And BASF has pioneered in this technology for fourteen years. We're the world's largest producer of CrO_2 particles, and have more continuous experience with CrO_2 magnetic tape than any other company.

So, while we thank IBM for the inspiration (and specs) for our new Model 480 Tape Cartridges for the 3480 drive, you can thank us for the major role we played in pioneering the CrO_2 medium.

Backed by a 5-year warranty, BASF Model 480 Tape Cartridges are now available in quantity for immediate delivery. When the data you'll need tomorrow depends on the tape you choose today, your long-term choice is BASF.

BASF



BASF

SYSTEMS & PERIPHERALS

Revolution in processing

From page 19

natural approach to programming. Some problems lend themselves to scalar processing, while others, such as all matrix-expressible problems and most signal processing problems, fall into the province of vector processing.

Still other problems, including many artificial intelligence searching problems and numerical problems like simulations, are best approached through the use of parallel processors. Some problems contain elements of all three processing modes. A notable example is image analysis, which involves the components of feature extraction, enhancement and signal processing.

Around the world, researchers in computer technology have reached the conclusion that very little is to be gained from further manipulation of scalar process-

ing. New languages and new computation approaches are being developed in dozens of laboratories, and they are being developed for a new generation of computers.

Beyond the fact that vector and parallel processors offer a variety of computational approaches, the inevitable increase in computation speed deserves consideration.

Today, an off-the-shelf Control Data Corp. Cyber 205 supercomputer can handle a matrix of 180 by 180 vectors with an inversion time of 0.46 seconds and a multiply time of 0.16 seconds, which is about 800 times the speed of a Digital Equipment Corp. VAX-11/780. A system with four or more CDC Cyberplus processors is theoretically even faster, but extensive algorithm and software optimization is required before that system approaches its theoretical maximum.

The sum effect of increased computational speeds and alternative approaches to processing, both available today, is that

a mathematician, scientist or engineer who uses advanced computer systems has a new degree of computational freedom. The restrictions of the past do not necessarily apply. Problems that require a supercomputer today will be solved on a typical mainframe computer tomorrow.

The implications of this mainframe revolution must be met head on. We at the Advanced Computational Methods Center have taken the first steps. We offer supercomputer training workshops to users who would like to learn more about vector or parallel processing. But one educational program at one university is not enough to prevent the potential dislocation of a whole generation of programmers.

This time, computers are not only growing smaller, faster and less expensive, they are changing in more fundamental ways. And as the machines change, a generation of machine and programming languages is evolving. Whether we are prepared or unprepared, the future is upon us.

Cyber has lab glowing

From page 19

our uses," says Robert L. McCrory, director of the Laboratory for Laser Energetics. That laboratory, operating under a grant from the U.S. Department of Energy, will use the 990 for two-dimensional simulations of the laser implosion phenomena.

McCrory notes that his laboratory could not afford a true supercomputer such as a Cray Research, Inc. X-MP or an ETA Systems, Inc. ETA-10. But he says of the CDC system, "An important thing is the operating system, called NOS/VE, which has been developed by Control Data so we can have access to the full two million words of memory. At least two million words are required for our applications. The IBM 3090, for example, was benchmarked in the same environment and for our applications just cannot compare with the performance of the 990. The Cray 1S, which is an older machine, certainly can do our job, but that is an older technology and is not the state of the art."

He adds, "The 990 is an affordable near-supercomputer, and I think it fills a place in the market that has been missing. Very few establishments like the government labs and the large oil companies can afford to buy the state-of-the-art supercomputer such as the Cray 2. Yet if you backed off of that, there was not a machine on the market that was not something better than just an enhanced VAX."

The laboratory is acquir-

ing a uniprocessor 990. McCrory declines to say how much the laboratory is paying. However, CDC officials say a typical system costs about \$5 million.

The 990 is replacing a Cyber/175 but also will reduce the laboratory's reliance on time-sharing arrangements with the John von Neumann Center, which operates a Cyber 205 in Princeton, N.J., and with Boeing Corp., which operates an X-MP.

He notes that researchers now use a Digital Equipment Corp. VAX 750 to access the von Neumann Center and Boeing systems but that a selling point for the 990 was the fact that it will not require a front-end processor.

Use of 990

He says the 990 will be used for programs requiring 100 to 150 hours of processor time and that larger jobs still will be moved to the von Neumann Center for processing on the Cyber 205 and on the ETA-10, which the center expects in 1987.

McCrory also reports that CDC's continuing financial problems were a consideration in the 990 acquisition.

"I would be lying to say that they were not. Any time you see severe market oscillation in any large company, it causes concern. All I can tell you is that I believe they are going to be in the computer business for some time to come. Their real strength, ever since William Norris founded the company, has been to address the scientific and engineering computer market. From what I can tell, they have been moving strategically to protect that important part of their base," Norris says.

ATTENTION: MIS Managers Info Center Managers DP Professionals



The James Martin Report on High-Productivity Languages

The single most authoritative source of guidance and advice on the selection and use of advanced computer software techniques. The James Martin Report is a 1500 page information service that is updated every three months.

A major feature of The Martin Report is in-depth product reviews of the most significant tools. These reviews are 30-50 pages long and offer practical advice on the selection and use of the best tools.

The Martin Report provides objective, authoritative information on:

Products

1-2-3
ADS/OnLine
APPLICATION FACTORY
Application System
CSP
DATATRIEVE
EXPRESS
FOCUS, PC/FOCUS
IDEAL
Info Center/1
INTELLECT
LINC II

MANTIS
MAPPER
NATURAL
NOMAD 2
QMF
RAMIS II
SAS
System W
TELL-A-GRAF
TIF
USE-IT
(and many others)

Technology

Strategic Use of Information
End-User Computing
Decision Support Systems
Information Centers
4GL Development Trends
Key Role of PCs
Micro/Mainframe Integration
Human Factoring
Intelligent Workstations
Prototyping Methodologies
Design Automation Tools
Role of Expert Systems

The annual subscription price of \$395 (outside U.S., \$425) for this new information service includes the initial report (over 1500 pages) and three quarterly updates. Order your copy today.

15 DAY FREE TRIAL

☐ Yes. Please send me The James Martin Report on High-Productivity Languages. I understand that I may return the report within 15 days and owe nothing if it does not meet my expectations. Otherwise I agree to pay \$395 plus \$17 shipping and handling for the report and three updates. Mass. residents add 5% sales tax. (Outside U.S., \$425 plus \$29 shipping and handling.)

☐ Payment enclosed. (Pay now and save the shipping and handling charge. You'll receive a prompt refund if you return it.)

☐ Bill my company. ☐ Bill me.

☐ Purchase order enclosed. (Please clip this coupon to your purchase order to ensure prompt delivery.)

Name _____
Position _____
Organization _____
Address _____
City _____ State _____ Zip _____
Telephone _____

Mail to: The James Martin Report
P.O. Box 969
Marblehead, MA 01945

FOR FASTER SERVICE CALL
TOLL-FREE 1-800-242-1240
In MA, 617-639-1958

TECH SUPPORT

— MVS — VTAM
— VM — CICS
— VSE — IMS

*Full time Professionals Available to
Assist your staff in the Installation,
Conversion, Tuning, and Maintenance
of the above products...and more.*

Dowling Associates, Inc.

CLEVELAND (216) 656-1136 AKRON (216) 650-0715 CONN. (203) 255-6316 NEW YORK (212) 912-1212



TSO USERS

Poor Response Time?
High Paging Rates?
Improve Your TSO
Performance with FSE+™

Compare these features:

- Up to 50% less overhead than SPF
- Full-Screen Editor (LRECL up to 32760)
- Data Set Manager (Controls TSO files)
- JES Sysout Previewer (Direct from JES Spool)
- File listing facility (LRECL up to 32760)
- Programmable function keys
- Split-Screen facility (Two fully-active screens)
- Customer-defined exit facility (Controls all FSE+ functions)
- FSE+ tuning parameters (Optimize performance)
- Structured menus for new users
- Command oriented for experienced users
- MVS 3.8, SP and XA support
- Free trial period

Call or write for details

Applied Software, Inc.

840 U.S. Highway #1, Suite 250 P.O. Box 13027
North Palm Beach, FL 33408 (305) 626-4818

Quality Software Since 1973

SYSTEMS & PERIPHERALS

Shearson adopts IBM's 3295

From page 19

various financial information services and the corporation's own mainframes and to display the data on windows. But the windows on the 3270-PC/XT would have overlapped, and with less than five months until the traders were to occupy their new offices, Shearson lacked the time to design and install a network, Miller says.

Another option consisted of using a Personal Computer AT with IBM's much-touted but seldom-used model 3295 plasma terminal. Each AT would function as a gateway to the financial information services. The

advantage of using the 3295 was that traders could open four independently controllable windows on a 19-in. flat-panel display.

Shearson opted for this approach because it not only saved desk space but offered the only feasible way to display the voluminous data each trader requires to make buy-or-sell decisions, Miller explains. It would enable traders to look at up to 60 stock listings via Quotron, which previously could have been accomplished only on a Quotron terminal.

'The real payoff'

Noting that the 3295 is 10 times more expensive than typical CRTs, Miller says cost was not the primary concern. "The real payoff comes with trader productivity rather than in equipment replacement," he suggests.

Shearson contracted with Programit, a New York software consultancy, to design the workstation. The firm was chosen because it had developed a multitasking version of Microsoft Corp. MS-DOS, called Taskmiser, which Miller says provided the horsepower to monitor the various information services simultaneously.

Currently, the workstation can capture and display data provided by Instinet Corp.'s Instinet trading system and Bridge Data Co.'s Bridge Data system, which tracks trading trends. Access to the National Association of Securities Dealers Automated Quotations (NASDAQ) Level III and Quotron stock quote services is undergoing final tests and will be added to the workstation next month, Miller says. Consideration is also being given to adding a fifth service, Autex, Inc.'s real-time block trading network, he adds.

Four-port board

Since some financial services such as NASDAQ provide add-in boards to enable PCs to emulate native terminals, a four-port board was installed in each AT console. Each AT has been fitted with a 1M-byte memory board for local processing in the event a trader wants to run Lotus Development Corp. Lotus 1-2-3 or Ashton-Tate Dbase II, Miller says. The AT's 30M-byte disk drives store data extracted from the firm's IBM 3080 and 3090 mainframes.

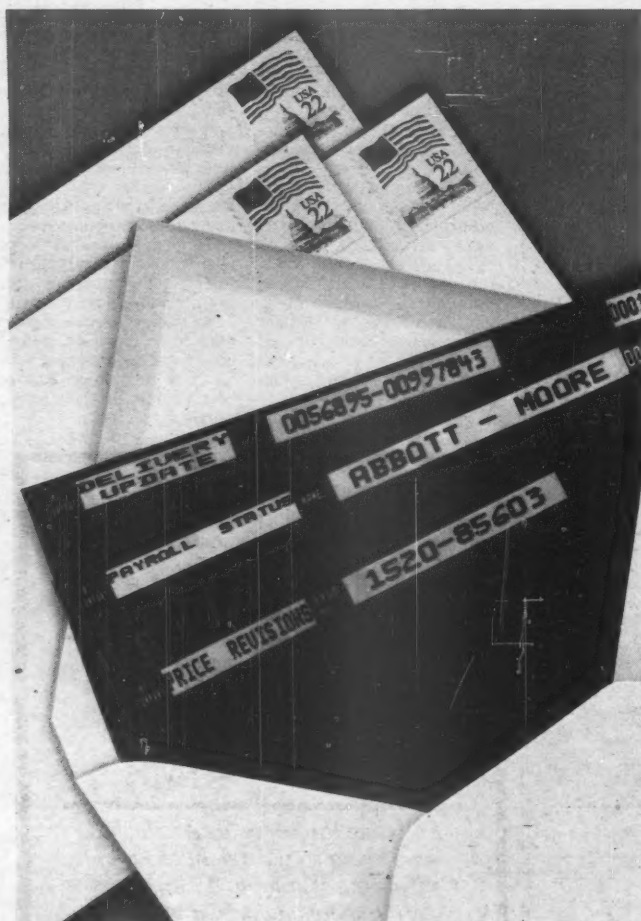
The AT keyboard was replaced by a Key Tronic Corp. unit with a touchpad to segue between services.

According to Programit Vice-President of Marketing Bill Rothfarb, the firm encountered problems synchronizing the various financial services so they could be simultaneously accessed by the AT and providing coding so the financial data could be displayed on the 3295.

Rothfarb points out that while IBM still considers plasma display to be an emerging technology (between 4,000 and 5,000 displays have been shipped since the product became available four years ago), it never considered the financial services sector as a proving ground. "They looked at computer-aided design and manufacturing as probable applications," he remarks.

Approximately 13 workstations are already in use, shared by two traders each, and four are awaiting assignment, Miller says. Shearson plans to install 40 to 50 workstations by mid-year and is weighing the possibility of equipping regional trading offices with the system.

HOW TO MAIL A 270-PAGE REPORT TO FOUR OF YOUR OFFICES...FOR A BUCK.



NCR DATA MANAGEMENT SERVICES

It makes perfect sense.

Compress a 270-page report into one, compact 4" x 6" microfiche. Reproduce it so accurately you don't know which is the original. Then spend a whopping 88¢ on postage to expedite this critical data to four of your offices. On time.

Sound easy enough. But all too often, as you are well aware, your COM servicer drops the ball. On quality, on service, and worst of all, on turnaround...and you're stuck with the bill.

It's time you bought yourself peace of mind. By buying computer output microfiche from NCR Data Management Services.

We've been in the business for over 15 years. Long enough to know that you need to be able to trust your COM supplier. So we keep our promises. 24 hours a day. Everyday.

NCR Data Management Services can also print and distribute your service publications, parts catalogs and other printed material on microfiche for a fraction of the costs required for paper. Plus, many offices can convert diskettes to fiche and service your laser printing requirements.

In short, NCR Data Management Services is your one vendor solution for better, faster service. For more information on the office nearest you, give us a call today.

1-800-CALL NCR

NCR

MICROCOMPUTERS



SMALL TALK
Edward Warner

Candor still best policy

First, Adam Osborne slid away from the computer industry limelight as the company he founded went bankrupt. Next, Apple Computer, Inc. cofounder Steve Jobs was forced out of the chairmanship of his firm. Most recently, Morrow Designs, Inc., a firm founded by the colorful George Morrow, filed for bankruptcy under Chapter 11.

Most of the slightly outrageous, always outspoken leaders of the personal computer industry apparently are being pushed aside, either by raw economics or dissatisfied shareholders. A pessimist might say that the era of outspokenness in the personal computer industry has ended.

Certainly it is rare of late to hear such one-time upstarts as Lotus Development Corp.'s Mitch Kapor or Microsoft Corp.'s Bill Gates say anything that does not sound neatly laundered and pressed by their corporate public relations departments. No longer can a reporter call a Lotus exec directly. Such calls must now go through the company's public relations department, in which "we'll get back to you" may mean "you might hear from us—in a week."

The reasons for the cautiousness go deeper than simply the "graying" of the personal computer industry. At root, cautiousness pervades the public statements of many in the industry because so many companies are now publicly held. Indeed, as more PC industry players go public (as Microsoft did last

See **CANDOR** page 27

Warner is editor of the Computerworld News Service.

IBM trumpets experimental speech recognition system

By Alan Alper

NEW YORK — In a rare display of technological chest beating earlier this month, IBM demonstrated a desktop speech recognition system that creates documents in response to human dictation.

The experimental product consists of a Personal Computer AT, two specialized speech recognizer subsystems and a directional microphone. It can recognize discrete utterances in real-time from a 5,000-word preprogrammed vocabulary and can transcribe sentences with 95% accuracy, IBM researchers said.

IBM officials would not say if or when the technology would become commercially available. In its current form, however, IBM said the prototype could handle office correspondence.

The prototype uses new CMOS digital signal processing chips in the two speech recognizer subsystems. One subsystem transforms the speaker's words into a string of "labels," encoding the speech. The other subsystem matches the labels to the system's preprogrammed vocabulary.

The system learns characteristics of each user's voice as the user reads a short document into the microphone. In practice, the system chooses the "candidate" word using a statistical model drawn up from an analysis of 25 million words. It selects the probable word as the person continues to speak and can distinguish between words that sound alike but are different through a built-in contextual ability. Punctuation is added verbally.

Frederick Jelinek, leader of the team that developed the prototype at the Thomas J. Watson Research Center in Yorktown Heights, N.Y., admitted IBM has a long way to go before selling speech recognition products. The main stumbling block, he said, is the system's inability to recognize continuous speech. Because the prototype only recognizes discrete words, users have to speak slowly and with pauses to ensure accuracy of word recognition.

Other challenges that must be faced, he said, include expanding and personalizing vocabulary coverage, improving resis-

See **IBM** page 26

Ashton-Tate offers utility packages

By David Bright

TORRANCE, Calif. — Ashton-Tate's Publishing Group has announced several software packages that add to the capabilities of Dbase III Plus and Framework II and that cost between \$39.95 and \$89.95.

The \$89.95 Dbase Tools for C: Programmer's Library includes an engine that links programs written in the C language to Dbase III Plus and also provides mathematical, financial, statistical and programming functions.

The four Framework II products are Decision Modeling, Project Analysis, Timeframe and Framelock.

Through the use of decision matrices, the \$69.95 Decision Modeling package helps managers to organize and analyze information. The software weighs the conse-

quences of different choices, graphs decisions and alternatives and saves and reports existing analyses.

Also priced at \$69.95, Project Analysis assists managers in defining, organizing and planning each step of a new project. A Skills Bank lists personnel and their special skills for task assignments while a Resources Bank compiles available resources to meet project requirements.

The \$39.95 Timeframe utility, which works with Framework and Framework II, features an appointment book, a calendar, a calculator and an office assistant.

Also carrying a \$39.95 price tag, Framelock performs file encryption and features two levels of security, password protection and an advanced cipher.

These add-ons are available now.

INSIDE

Application vendors detail support for IBM's PC Convertible/27

NEW THIS WEEK

- Pick Systems upgrades its operating system for IBM's PC XT
- True Basic is ported to the Apple Macintosh

■ For more on these and other new products, see pp. 87-108.

INSTANT ANALYSIS

"The real leverage you have is to provide recognition. When the guy down in finance who wrote the application looks like a star, that's the biggest carrot you can put in front of people."

— Robert Perry, marketing support manager for applications, Lotus Development Corp., on encouraging standard ways of building applications

Advertisement

Advertisement

Advertisement

Oracle unveils productivity tools for SQL/RT on the IBM RT PC

Oracle Corporation has announced six software products for the newly-announced IBM RT PC system. The packages run with IBM's SQL/RT relational DBMS, which was developed by Oracle for IBM. Oracle also announced immediate availability of its full ORACLE product line on the RT PC/AT co-processor.

According to Oracle Director of Product Marketing, Ken Cohen, "The SQL/RT product which IBM is marketing on the RT PC provides a robust relational DBMS. Since Oracle was the source of SQL/RT, we feel well-suited to offer our other products directly. They provide even greater flexibility and decision-support capabilities to RT PC users."

□**Pro*Fortran:** The Pro*Fortran precompiler allows RT PC programmers to embed SQL database language statements in the middle of their Fortran programs. It is intended for Fortran programs which must access or manipulate SQL/RT database information.

□**Pro*SQL:** Pro*SQL is a general-purpose call-interface to SQL/RT. Using a simple set of programming calls from a variety of languages supported on the RT PC, the programmer can access SQL/RT.

□**SQL*IAF:** The SQL*IAF (Interactive Application Facility) package is a complete application generator and run-time system for forms-based applications. It is a complement and

extension to the Easy SQL/RT component of IBM's SQL/RT.

The SQL*IAF screen painter lets users design forms using what-you-see-is-what-you-get techniques. Multi-table query/update forms can be easily produced for demanding applications. Also, SQL*IAF lets users apply data editing and validation criteria to data entered into forms. Finally, SQL*IAF provides extensive support for non-IBM terminal types, such as DEC's VT-220.

□**SQL*RPT:** SQL*RPT is a report writer and formatter for use with SQL/RT. Using simple commands, users can create reports of almost unlimited sophistication from their databases.

The database information can also be included in documents formatted with SQL*RPT, allowing text and database processing to be combined in one easy-to-use interface suitable for developers and end-users alike.

□**SQL*Calc:** SQL*Calc is a Lotus 1-2-3 compatible spreadsheet integrated with the SQL/RT DBMS. Users can place SQL statements into the cells of their spreadsheets, retrieving and updating SQL/RT data automatically. Large SQL/RT databases can be shared among spreadsheets users, with all of the database instantly available to them.

□**SQL*Link:** SQL*Link provides a micro-mainframe link which allows intelligent transfer of database information be-

tween SQL/RT on the RT PC and the Oracle relational DBMS running on IBM PCs and a variety of mainframes and minis.

SQL*Link lets users exchange information between PCs with ORACLE and the RT PC, with the RT PC serving as a Host.

The package also lets users of SQL/RT exchange database information with a mini or mainframe running ORACLE.

□**PC/DOS Support:** The ORACLE relational DBMS, 4GL and DSS tools are also available to run on the IBM RT PC/AT co-processor option.

Oracle produces and markets the ORACLE relational DBMS, 4GL and DSS software. ORACLE runs on a wide range of computers, including IBM mainframes, DEC, DG, HP, Stratus and most other minicomputers, and a wide variety of micros, including the IBM PC family.

Oracle distributes its products through a worldwide network of 30 direct sales offices, through the Authorized Oracle Dealer network, and through VARs which participate in the Oracle Alliance program. With its direct OEM marketing efforts, ORACLE is used by 39 of the top 50 multi-national corporations and at thousands of sites overall.

For further information, contact Oracle Corp., Dept. CWST3, 20 Davis Drive, Belmont, CA 94002, 1-800-345-DBMS.

MICROCOMPUTERS

IBM trumpets speech system

From page 25

tance to extraneous noise and designing a suitable editor to facilitate document creation.

IBM is developing a 20,000-word speech recognizer for the PC AT, Jelinek said. It currently has a prototype that runs on IBM 4300-

class machines, he added.

In demonstrating its speech recognition technology, IBM broke with its custom of not discussing products under development. IBM did so, Jelinek said, because the prototype represents a significant advance in the technology.

The prototype, he noted, requires only 640K bytes of storage and contains much of the functionality of the real-time speech recognizer IBM demonstrated in 1984, which

required 6M bytes of storage and was based on an IBM 4341, three floating-point array processors and large-scale disk storage units.

'Flaunt it'

"We're proud that no one else has it," Jelinek remarked. "If you've got it, flaunt it."

Industry analysts, however, said IBM may have provided a glimpse into its speech recognition product strategy because of techno-

logical advances made by competitors that are shipping, or close to shipping, commercial products.

Amy Wohl, president of Wohl Associates, Bala-Cynwyd, Pa., pointed to Dragon Systems, Inc. of Newton, Mass., and Kurzweil Applied Intelligence, Inc. of Cambridge, Mass., as two firms with promising speech recognition products.

"IBM could be getting nervous that they're far away from having a commercial

product and these other companies are stealing their thunder," she said. "Even though these firms are not able to deliver the same level of technology, they are making commercially available products."

Mike Tomasic, president of Kurzweil Artificial Intelligence in Waltham, Mass., said his firm has been shipping a 1,000-word recognition system since last June for use with a wide variety of microcomputers and mainframes. Listing for \$65,000, the Kurzweil Voicewriter 1000 has been delivered to "several hundred customers," he said, declining to specify names.

Kurzweil prototypes

Kurzweil AI has working prototypes of a speech recognition system that, with the addition of a personalized vocabulary, can understand between 5,000 and 10,000 words, Tomasic said. Beta shipments are expected to commence this year.

Kurzweil AI's new product recognizes discrete words, Tomasic said, but comes closer to approximating real-time operation than the experimental product demonstrated by IBM.

"It's hard to tell the difference between continuous speech and discrete words because our product recognizes words with only a one-tenth of a second pause," Tomasic claimed.

Dragon Systems will make two speech recognition product announcements this month, according to Jim Baker, the firm's chief executive. The 4-year-old company will disclose availability of its Voicscribe 1000 speech recognition software package for microcomputers, which is said to recognize up to 1,000 words, and will demonstrate 2,000-word capability.

However, Peter Kibler, a senior consultant at International Data Resources, Norwalk, Conn., predicted that broad acceptance of speech recognition products in the corporate environment will not occur until accuracy tops 99% and continuous speech is a reality.

"Even with 95% accuracy, that's one out of 20 words on average that is incorrect. That's not very good," he said. "Therefore, I don't think any of the products today will penetrate the broad market."

Now there's a software package
for batch file transfer
that saves you time, money
and confusion
because it sends
any number of files,
to any number of locations,
at any number of times,
to start any number of jobs.
All by itself.
We call it SYNCRA™ Software.

It's worth a call.
1-800-448-3400, Ext. 180.

EASTCOM

A Kodak Company

File-transfer software for compatibles
and the incompatibles.

Ask for a free R.O.I. analysis, details on available SYNCRA Software packages, or an appointment with an EASTCOM sales representative. Use our number above. Or write us on your letterhead: EASTCOM, Dept. 180, P.O. Box 10394, Rochester, NY, 14610.

SYNCRA is a trademark.

© Eastman Kodak Company, 1986, Eastman Communications (EASTCOM), A Division of Eastman Kodak Company.

**BTAM
EXPERTISE**

CALL

CDI INC.

4009 PCH

TORRANCE, CA 90505

(213) 375-2311

MICROCOMPUTERS

IBM laptop software unveiled

By David Bright

When IBM introduced its PC Convertible laptop earlier this month, a number of software vendors announced support for the system's 3½-in. floppy disk format. However, many had not yet decided how to package and sell the 3½-in. version.

Among suppliers announcing 3½-in. media support along with specific policies were Borland International, Inc., Computer Associates International, Inc. and Living Videotext, Inc.

Existing customers of the Scotts Valley, Calif.-based Borland may order PC Convertible programs for a \$10 fee that covers manufacturing, shipping and handling. All 13 of Borland's software products, including the Reflex data base management program and the Sidekick desktop organizer, should be available next month. Prices for Reflex (\$99.95), Sidekick (\$84.95) and the company's other programs are the same for both media formats.

Three PC Convertible programs are available from Computer Associates International's Micro Products Division in San Jose, Calif. These programs — Super Calc 3 Release 2 (\$395), Superproject Plus (\$495) and Easywriter II (\$395) — come with both 3½-in. and 5¼-in. disks. Current users may obtain a product in the 3½-in. format for a \$50 fee.

Candor still best policy

From page 25

month), the reticent mood will spread.

The world is a more lighthearted place for the string of clever industry one-liners in Morrow's little red book, *Quotations from Chairman Morrow*. But could Morrow have said, "Computer companies are like desert flowers, they bloom overnight and are gone" if he were on the eve of a public offering?

As the once-free-wheeling PC companies take on the mantle of silence, they may think they are modeling themselves on the biggest and most successful player in the industry.

But if they are attempting to ape IBM, they should look again. Even IBM has come to realize it has paid a high price for its goal of a bland corporate image and "no comment" attitude and shows some signs of turning away from its old ways.

Recently, Big Blue engaged in an act that may be unique in its history: In February its PR people called reporters to discuss IBM's most recent 4300 upgrade and 3090 uniprocessor announcements, both which had occurred a month earlier.

In making those calls, IBM's PR folks acknowledged the damage that can be done by closemouthed behavior. IBM had never held a press conference for the announcements, and the company said it thought that misimpressions about the machines had arisen.

With so many PC industry players taking their cues from IBM, it is good to know that their Big Blue role model just might yet teach them a thing or two about the value of candor.

Living Videotext of Mountain View, Calif., has begun shipments of PC Convertible versions of Think-tank, a \$195 program used to organize and manage hierarchical structures of facts and ideas and Ready, a \$99.95 memory-resident outline processor. For \$40, Living Videotext will send a 3½-in. version of a program to owners of the 5¼-in. versions.

Both Borland International and Computer Associates International said their special deals for existing customers are designed for users who may work on one micro at the office and another on the road or at home. The license agreements prohibit users from running the software on a second office machine.

"Software Options From India"

EEPC, India with the co-sponsorship of ADAPSO is organizing seminars for fostering understanding between Indian and U.S. companies in the field of software at:

NEW YORK CITY
LaGuardia Marriott
May 5 & 6, 1986

SAN FRANCISCO
Fairmont Hotel
May 8 & 9, 1986

ATLANTA
Hotel Tower Place
May 12 & 13, 1986

For further details, contact:

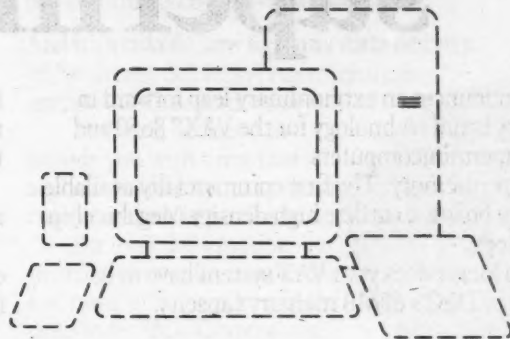
Engineering Export Promotion Council of India
(Sponsored by the Ministry of Commerce, Government of India)

727 W. 7th St., #658
Los Angeles, CA 90017
Tel: (213) 622-8548

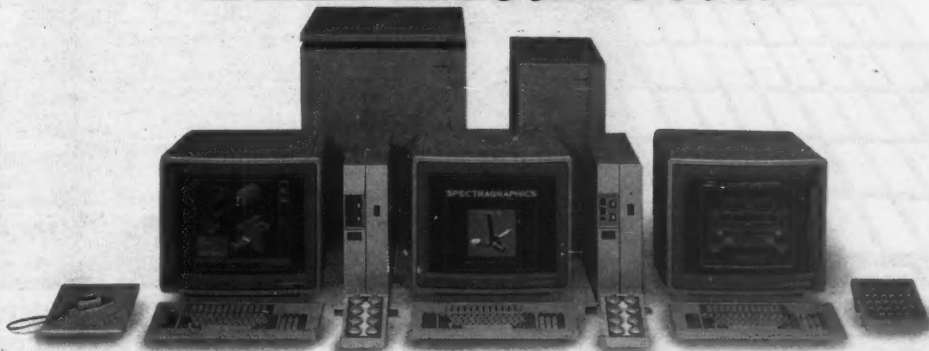


333 N. Michigan Ave., #2014
Chicago, IL 60601
Tel: (312) 236-2162

Think.



Think ahead.



At Spectragraphics, we've always had a company philosophy of not just thinking, but thinking ahead. It's something to strive for. And it does more than just sound nice in our corporate brochure.

It pays off.

For example, last year we introduced the DesignSet 1080™ a graphics terminal that's compatible with the IBM 5080.

As good as it was at the time, the most important feature of the DS 1080 was its potential. A designed-in poten-

tial for growth with easy field upgrades. So every DS 1080, this year's or last's, can have all the most up-to-date features we have to offer. With complete compatibility and maintainability. Which gives our model a future without planned obsolescence.

Unfortunately, that wasn't an option given to customers of companies who merely think. Customers who are now working with out-of-date models that aren't even a year old.

In addition to the foresight we have in designing products, Spectragraphics

has the track record, stability and service to back them up. Because we know that those things help just as much in making your system run smoothly.

So, all that being said, the decision is up to you.

You can think.

Or you can think ahead. With Spectragraphics.

SPECTRAGRAPHS
Where your ideas take shape.

Spectragraphics Corp., 10260 Sorrento Valley Rd.,
San Diego, CA (619) 450-0611.
DesignSet 1080 is a trademark of Spectragraphics Corporation.

EMC just gave the most advanced superminis the most advanced supermemory.

EMC announces an extraordinary leap forward in memory board technology for the VAX™ 8650 and 8600 superminicomputers.

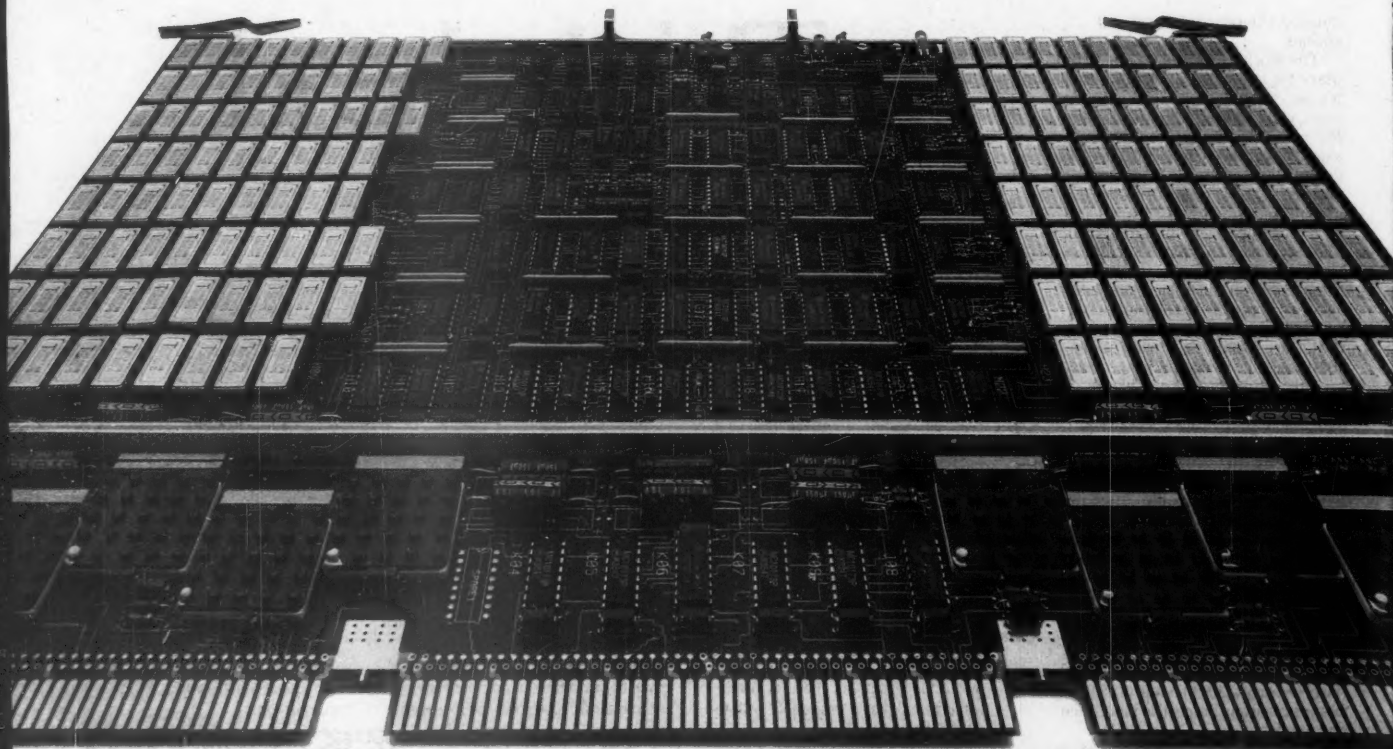
Supermemory: The first commercially available memory boards to utilize high-density Megabit chip technology.

No longer does your VAX system have to be limited by DEC's 68MB memory capacity.

Now you can give it as much memory as your current and future applications require—from 20MB all the way up to 128MB.

And do it with the most reliable memory ever manufactured.

For the first time, you can give your VAX system enough speed and performance to rival most mainframes.



Our 16MB supermemory design takes half the space of DEC™ add-in memory boards.

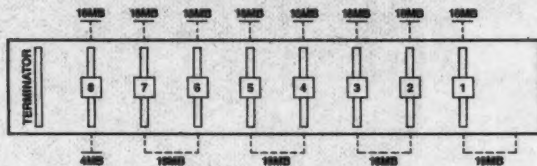
One of the big differences between EMC's new 16MB supermemory and DEC's 16MB memory is obvious at a glance.

DEC's board is twice as fat as ours.

That's because it's actually a cumbersome multiple board assembly.

What's more, DEC uses older 256K RAM technology and surface-mounted devices that require over

Each EMC 16MB supermemory board takes up only one slot.
Maximum capacity 128MB.



Each DEC 16MB memory board takes up two slots.
Maximum capacity 68MB.

11,000 solder points. That's nearly *five times* as many board connections as you'll find on our new supermemory.

As a result, DEC's multi-layered 16MB board takes up two full slots. While EMC's new 16MB supermemory board occupies just one.

By making full use of every available memory slot, our new supermemory virtually *doubles* your VAX system's main memory capacity.

And you'll protect your investment with EMC memory through generous trade-up credits. If you start with our 4MB cards and in the future want to upgrade to higher capacities, you never lose a cent of your initial investment.

You can configure our supermemory with any combination of EMC or DEC 4MB or 16MB memory boards into either an 8650 or 8600.

All, we might add, without affecting your DEC maintenance agreement in any way.

Super reliability plus the industry's only unconditional lifetime warranty.

Our new supermemory's greater density of RAM delivers the *highest reliability per bit or byte ever offered* by any manufacturer.

Every single EMC supermemory board undergoes a rigorous 100-hour test and burn-in procedure. Including 24 straight hours of CPU qualification under online conditions in our own VAX 8600 superminicomputer.

Because EMC memory boards are so reliable, there are *no maintenance charges* of any kind.

While with a DEC memory board, your maintenance charges over five years would amount to a stiff \$24,000 per card.

Another super product from the world's largest independent supplier of add-in memory.

No other independent supplier offers you anywhere near the variety of different memory sizes for the VAX system family.

Not just for the 8650 and 8600, but for the 785, 780, 750, 730 and the MicroVAX™ II systems as well.

And every EMC add-in memory board comes with our *unconditional lifetime warranty*. The only one in the industry.

If you even *suspect* a problem, just call our special toll-free number and we'll rush you a new board within *24 hours*—absolutely free.

And it's available now for immediate delivery.

We're already delivering our revolutionary new 16MB supermemory.

And we'll be happy to provide you with a free cost analysis based on your system's current and anticipated needs.

For more information—or to order—just call us at the toll-free number below. Or mail the coupon to: EMC Corporation, 12 Mercer Road, Natick, MA 01760.

Do it today. And give your VAX supermini the supermemory (and performance) you both deserve.

For information or to order, call today:

1-800-222-EMC2

(In MA, call 617-655-6600)

European Headquarters: In London (088385) 2434; International Number 44 88 385 2434. U.S. TELEX 948615. VAX, DEC and MicroVAX are registered trademarks of Digital Equipment Corporation.

YES, I want more information about increasing my VAX system's capacity with EMC's new supermemory. Please call me immediately.

VAX Model(s) _____

Name _____

Title _____

Company _____

Address _____

City _____ State _____

Zip _____ Phone _____

Mail to: EMC Corporation, 12 Mercer Road, Natick, MA 01760.

EMC²

No one is more committed to memory.

CW-4-21

See us at DEXPO South, Booth # 1126



Rumor has it you're moving up to T1.



Come back.

T1 speed.

It doesn't have to be as scary a project as everyone thinks. Fact is, installing T1 can be a fairly simple chore.

We're Infotron.

We design, build, and install communications networks. Reliable.

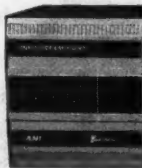
Compatible. Sophisticated T1 networks that support data and compressed digital voice.

Our newest system, InfoStream™, introduces an open architecture to T1 networking based on Infotron's long-established strengths in multiplexing

and switching.

We'll take care of you every step of the way. Before. During. And after the sale.

Calm down. Dust yourself off. Then call: 800-345-4636.



INFOTRON SYSTEMS

COMMUNICATIONS



WIRE TAP
Walter E. Ulrich

X.400 protocol in the mail

Also known as the Message Handling Standard, X.400 will do the same for messaging as the X.25 standard did for data communications. It will create order out of chaos and interconnection out of incompatibility.

The X.400 standard specifies the format in which messages can be exchanged between various systems. It is a broad standard that goes beyond text messages to include voice and a wide range of message delivery options. The Consultative Committee on International Telephony and Telegraphy formally approved the standard in 1984.

Electronic mail has every bit as great a potential for business use as the telephone. It is fast, efficient, convenient and inexpensive. Unfortunately, most in-house message systems and electronic mail subscriber services are incompatible. Electronic mail provides a communication oasis for communities of interest that subscribe to the same system, but because there are no aqueducts between different systems, a vast electronic desert separates sets of users.

When users are unable to send a message electronically to all their intended recipients, they often use the lowest common denominator that will reach everyone: They simply dictate a memo and send out copies through interoffice or U.S. mail.

Even without intervendor connectivity. See X.400 page 34

Ulrich is president of Walter Ulrich Consulting, based in Houston.

Users seek net management

Effective control seen as user priority, not reality

By Peggy Watt

LOS ANGELES — Managing multivendor communications systems of growing sophistication proved to be the dominant theme of the recent Network Management Technical Control conference. But while the technical sessions dealt primarily with broad issues relating to cost justification, design, user support and vendor relations, many attendees seemed more interested in the nuts-and-bolts diagnostic and monitoring tools on display on the exhibit floor.

James Clay Jr., data communications engineer for TRW, Inc.'s Operations and Service Group in Redondo Beach, Calif., was scouting equipment for diagnostic monitoring to manage his multivendor network, which consists of several local-area networks as well as radio and laser links to four remote sites.

He said that test equipment at every

site is "desirable but not feasible. Right now I need to rely on user feedback to be sure equipment is operating properly."

Telecommunications project director Janet L. Bruman was gathering information on network options for the North Bay Cooperative Library System in Northern California. She said she could easily assemble a formidable wish list but that her real list was limited by the public agency's budget restrictions.

The cooperative of six county libraries is looking for a turnkey network system that would enable several dozen terminals to share records and information residing on four separate computers. "Some of the administrative problems are at least as bad as the technical problems," Bruman said.

Exhibitors appeared to be responding to the burgeoning demand for more versatile and sophisticated network management tools. "In a multivendor environment, managers are having to be more savvy, because they're in control of their own desti-

See USERS page 36

AT&T, IBM vie for net lead

By Elisabeth Horwitt

"Users hoped that AT&T and IBM's emergence as dominant players in the networking market would clear things up," Architecture Technology Corp. President Kenneth Thurber recently told an audience of user and vendor organization representatives. "But it turned out just the opposite: Users now are more confused."

According to Thurber, the two giants bring complementary strengths and weaknesses to the network wars. "AT&T has the more sophisticated transport mechanism, while IBM is strong when it comes to application interfaces."

Thurber elaborated that AT&T's primary data network products, Datakit and Information Systems Network (ISN), "are faster, cheaper and offer much higher performance" than IBM's Token-Ring net-

work, which he said is "very complex and expensive and hard to manage under a heavy traffic load."

Datakit is now "quietly being sold to regional Bell operating companies under the name of Colan," while ISN is marketed as a user-premise data network, according to Thurber.

On the other hand, Thurber said, neither AT&T nor the Open Systems Interconnect networking model that AT&T supports, offer a network operating system comparable to IBM's System Network Architecture (SNA).

"SNA is a very mature product with a rich set of application interfaces which are open to other vendors," Thurber said. AT&T needs to develop a similar set of offerings that will take care of networking

See AT&T page 34

NEW THIS WEEK

- Northern Telecom adds a teleconferencing system and workstations to Meridian DV-1
- Equatorial Communications offers Private Newswire satellite message generation and delivery system

■ For more on these and other new products, see pp. 87-108.

INSTANT ANALYSIS

"Effective multi-vendor network management is the key ingredient in our strategy for the foreseeable future, centering on providing quality service to both internal and external customers at competitive costs."

— David Mieszcanski, vice-president, global communications operations, BankAmerica Corp.

GTE Sprint challenges AT&T, MCI with high-volume, dedicated service

By Mitch Betts

WASHINGTON, D.C. — GTE Sprint Communications Corp. has begun to offer a dedicated-line service called Sprint Advanced WATS Plus, designed to compete with MCI Communication Corp.'s Prism I service and AT&T's Megacom rates for high-volume customers, the firm announced recently at the Federal Office Systems Expo.

GTE Sprint officials asserted that the service is priced competitively with MCI's Prism I and offers average savings of 10% to 12% off AT&T's Megacom rates.

The officials said the pricing structure is not sensitive to the number of lines in use and, thus, gives customers the flexibility to change the number of dedicated circuits as needed.

Sprint Advanced WATS Plus can

be used in conjunction with digital T1 or analog connections to the local telephone company or through customer-provided bypass, the vendor said.

The monthly base charge is \$1,000 per location plus a \$5 port charge for each active circuit. Calls are billed at flat rates calculated in 6-sec. increments and based on distance and time of day.

The new service, aimed at customers with monthly usage of \$10,000 or more, is available from 66 major cities and includes international dialing to 20 countries served by Sprint, the Burlingame, Calif.-based vendor said.

GTE Sprint and United Telecommunications, Inc. are in the process of forming a partnership, to be known as U.S. Sprint Communications Co. [CW, Jan. 20].

Pac Bell to augment DDS

Channel proposal to aid network management

By Peggy Watt

SAN FRANCISCO — Pacific Bell Telephone Co. plans to offer a secondary channel enhancement for its Digital Data Service (DDS) for user control of network management and related functions, the company announced recently.

Pacific Bell, an operating company of the Pacific Telesis Group, will submit the new service proposal to the California Public Utilities Commission for approval sometime in mid-year, a spokesman said. The company hopes to implement the new service in the fall.

The secondary channel would allow DDS subscribers to do their own network management, including control, analysis and diagnostics, moni-

toring and telemetry on a parallel channel without interrupting normal data flow, said Mike Trombetta, Pacific Bell product manager.

It would require a new Channel Service Unit/Data Service Unit (CSU/DSU) to be installed at the customer's premises and a new channeling unit at the central office serving the customer, Pacific Bell said. The DSU handles timing recovery, synchronous sampling and bipolar digital conversion needed for the DDS transmissions and interfaces with the customer's transmitting equipment. The CSU acts as an analog modem connection to the copper wire.

Pacific Bell's private-line digital transmission system handles data among two or more points at rates of 2,400, 4.8K, 9.6K or 56K bit/sec. The proposed secondary channel would operate on an independent parallel path at subrates of 133, 266, 533 and 2,666 bit/sec.

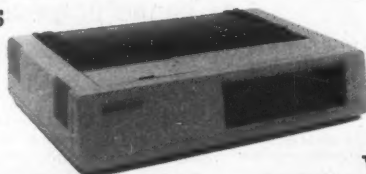
HERE'S THE BIGGEST REASON TO DUMP YOUR OLD PRINTER.

AL

That's pronounced "Alps"

As in Alps Electric Co., Ltd., the Japanese company that manufactures the new Alps P2000™ Dot Matrix Printer. Which happens to be the perfect PC printer for companies who've outgrown their old ones.

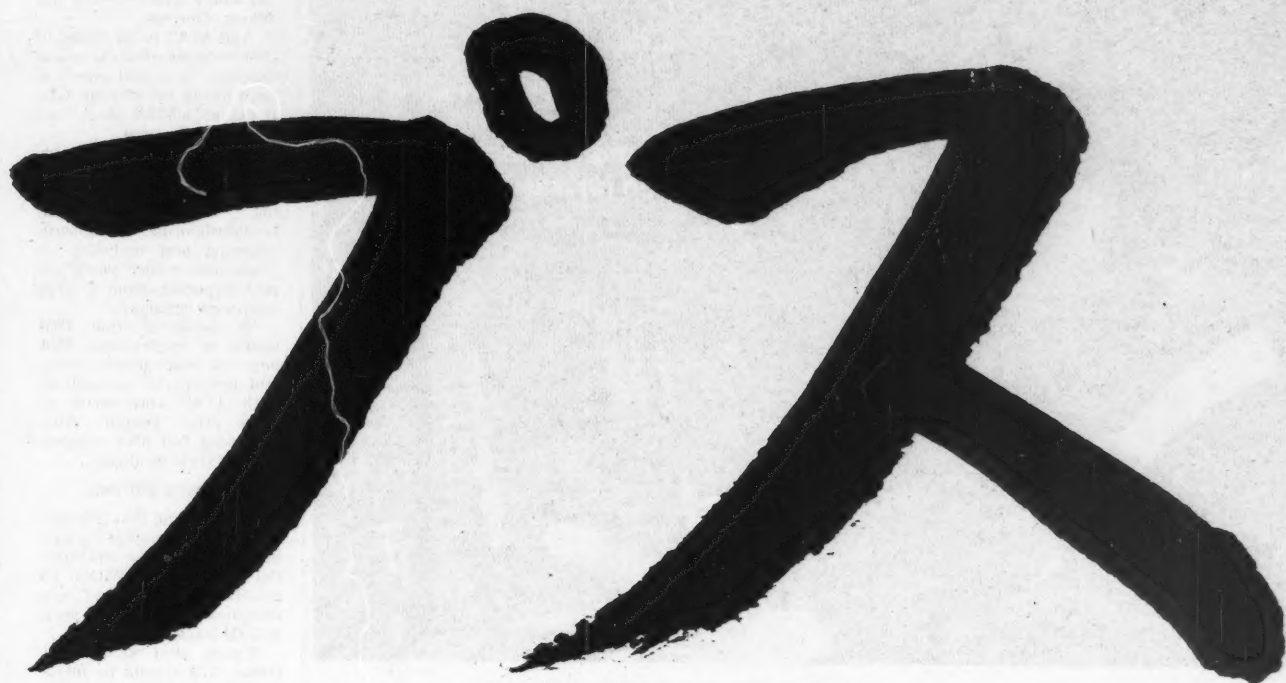
Fine. But who's Alps Electric?
And what difference does it make?



Alps Electric is an International Fortune 500 company. A \$1.5 billion manufacturer of computer and electronic products.

A company that has been making computer printers for a decade and selling them in countries throughout the world. Including this country (under the brand names of major computer manufacturers).

P2000 is a trademark of Alps Electric Co., Ltd. ©1985 Alps America.



What's more, Alps Electric is the parent company of Alps America, the company that sells, services and supports Alps printers in America.

And the difference all that makes is this.

Whether you're buying one printer or a thousand, you really ought to buy them from a solid, experienced company you can depend on.

Which is exactly what we are.

Alps. Now that you know how to say it, perhaps you'd like to dial it. (800) 828-ALPS. In California, call (800) 257-7872.

We'll give you all the reasons the Alps P2000 should be your next PC printer. And we'll give you a brochure about it.

One written in plain English.

ALPS
AMERICA

COMMUNICATIONS

X.400 is in the mail

From page 31

ity, electronic mail has been growing at a rate of between 75% and 90% annually. The Office of Technology Assessment projected that more than 10 billion messages will be originated electronically in 1990. Given the multivendor interconnection provided

by the X.400 standard, this is attainable.

Vendor acceptance of X.400 is growing rapidly in both the U.S. and Europe. Foreign Postal, Telephone and Telegraph administrations have endorsed X.400 and will insist that message systems in their countries conform to the standard.

Fifteen out of 17 leading electronic mail vendors recently interviewed by Walter Ulrich Consulting were firmly committed to X.400. One

vendor, IBM, was unwilling to comment.

But while IBM has a strong vested interest in pushing its own Document Interchange Architecture/Document Content Architecture (DIA/DCA) as an electronic mail standard, pressure from European customers should force IBM to provide bridges to X.400, as it did to X.25.

Like X.25, however, X.400 is far from a mature stan-

See X.400 page 36

AT&T, IBM vie for lead

From page 31

functions, such as the ability to distinguish between local and remote connections, he added. "Otherwise, such tasks must be taken care of at the application level," forcing users to rewrite their programs to deal with each new change in the network.

Thurber claimed that LU6.2 enables users to build "a daisy chain of applications which use each others' results; although I'm not saying this can be done easily or for free."

IBM needs to provide a more powerful implementation of SNA on its Token-Ring network, which so far only connects IBM Personal Computers directly, Thurber said.

He added that IBM needs to address the growing user demand for links to long-distance networking standards such as T1 and Integrated Services Digital Network, areas where AT&T already has strong offerings.

And AT&T is far ahead of IBM in terms of multivendor support, "a crucial aspect of networking for anyone who is not an all-IBM shop," according to Thurber.

He added that AT&T also "has a leg up" over IBM when it comes to tools for doing network monitoring, troubleshooting, capacity planning and updating — "functions where you'd expect expertise from a large telephone company."

He predicted that IBM would be emphasizing SNA network management more and more, partly to catch up with AT&T and partly to block other vendors from achieving full SNA integration for their products.

One-upmanship with nets

Thurber said that IBM and AT&T would engage in one-upmanship in the networking speeds arena. Within 18 months, he said, AT&T will introduce an ISN model with a 128M bit/sec. backplane.

Within that same time frame, IBM should be introducing an optical-fiber token ring with 256M bit/sec. aggregate throughput, he added. Top speed for the Token-Ring net is currently 4M bit/sec., as compared with ISN's 8M bit/sec. optimal rate.

As companies continue to move from departmental to corporate networking solutions, they will run head on into the IBM vs. AT&T confrontation, Thurber said.

He added that, formerly, upper management was rarely involved in buying decisions. "Now, you have conflict between data processing departments that traditionally deal with IBM and telecommunications departments that have always dealt with AT&T."

Cabling is one fundamental issue of the conflict, which communications managers need to resolve with reference to cost, risk and strategic direction, Thurber emphasized.

"Businesses have the choice of either putting in giant raceways for future cable installations or installing every possible type of cable to avoid running out of capacity," he said.



In 1876, telecommunications took a giant step forward.

Today, the telecommunications industry is making advances by leaps and bounds. To help you keep up with it, there's ICA. The International Communications Association—the association of large professional telecommunications users providing comprehensive, up-to-the-minute information and education in the fields of voice, data and image communication. ICA also sponsors one of the largest telecommunications exposition in the world. It's called "Telecom." And this year it's being held in Atlanta, June 2nd thru the 5th, at the Georgia World Congress Center.

At Telecom '86, you'll be able to see new ideas, new applications, new technologies, as well as new ways to upgrade your Telecom systems, through hands-on exposure. All the latest equipment will be on display from vendors, from the U.S. and the world over, in every area of the telecommunications industry.

In addition to the exposition, Telecom '86 includes two industry seminars June 3 and 4 for all expo attendees.

Telecom '86. Don't miss it for the world. Alexander Graham Bell wouldn't have.

For a \$10.00 discount coupon off the \$25.00 price of admission, send a copy of this ad and your business card to Crume Direct, 1303 Walnut Hill Lane, Irving, Texas 75038.



INTERNATIONAL
COMMUNICATIONS
ASSOCIATION

cpw



PRESENTING THE STRONGEST BASKET IN THE SOFTWARE INDUSTRY.

These days, more corporations than ever are putting their software eggs in one basket.

No longer are they buying packages, one at a time, from several vendors. They're buying whole families of packages from a single full-line vendor.

Buy all this software from the right source and you win big. In one stroke, you integrate your software, reduce training time, and vastly improve DP productivity.

Buy it from the wrong source and you've got

a very expensive omelette. Token integration. Training nightmares. DP chaos.

Given these two distinct possibilities, there's never been a better time for prospective software customers to find out about McCormack & Dodge. And the unique safeguards we offer the long-term software purchaser.

Safeguard number one is our Millennium integrated environment. Millennium is the acknowledged industry leader in borderless

application technology. No imitation even comes close.

Safeguard number two is our worldwide user support. We're on call day or night in 33 countries.

Worldwide support takes resources, which leads us to safeguard number three, Dun & Bradstreet. No American company has enjoyed longer financial stability. Nearly 150 years of it.

Keep this in mind next time you go shopping for golden eggs.

McCormack & Dodge

DB a company of
The Dun & Bradstreet Corporation

McCormack & Dodge Corporation, 1225 Worcester Road, Natick, MA 01760, 1-800-343-0125

COMMUNICATIONS

Users seek net management

From page 31

ny," said Dave Ryan, who was showing Digitech Industries, Inc.'s protocol analyzers.

Digilog, Inc. was exhibiting its newest protocol analyzer, which monitors multi-vendor network equipment "and avoids finger pointing,"

said Harold Draper, western regional manager of the San Jose, Calif.-based company. The Digilog Model 300 is priced at \$4,995.

Draper admitted the equipment could be overkill for small, single-vendor networks but not, he added, for companies that now have to deal with a multitude of carriers and equipment vendors "where before, a simple phone call to friendly AT&T was enough."

Draper pointed to an in-

crease in the sophistication of test equipment in general. "A few years ago, we had basically only bisynchronous and asynchronous" monitoring. Today, there are management tools for IBM Synchronous Data Link Control, X.25 and IBM Systems Network Architecture (SNA) networks.

The bit error-rate test can monitor standard AT&T signals to determine whether a problem is in a line or transmitter, he said. "It keeps Bell

on its toes. They can't just say, 'Nope, it's not the line.'"

During a seminar on IBM SNA network management, however, Atul Kapoor, vice-president of consulting for Kaptronix, Inc., chided vendors on the gaps that exist in current network management products.

"There's still a lot of progress to be made," he said. "Networks do not exist to provide intellectual challenges for managers."

Several speakers empha-

sized that network managers need to do their own monitoring and troubleshooting in order to serve users and deal with vendors effectively.

Troubleshooting plans

Gabe Kasperek, president of data communications consulting firm Kazcom, Inc. recommended that managers adopt specific troubleshooting procedures that include defining a problem, isolating it and restoring the system.

He told managers not to underestimate the last step. "If we're substituting equipment, you'd better verify. The best way to get the user into irate mode is to say everything's all right, and it's worse," he emphasized.

Keeping equipment inventory up to date and thoroughly documenting installation procedures are often "matters of self-defense," Kasperek said, "because vendors are not always so careful. You must have your own quality control. If you haven't tested, Murphy's Law is going to apply."

X.400 is in the mail

From page 34

dard. Two issues still being debated are settlement and directory. Settlement deals with the question of how to split fees when messages are handled by more than one carrier. Since revenues are ample and there are precedents for dealing with such matters, this issue should be resolved soon.

The directory issue is more complex. An electronic mail directory should be easy to use and should uniquely identify recipients' addresses anywhere in the world.

The most friendly and elegant solution is a distributed data base, but that raises several issues relating to directory ownership and control. Vendors zealously guard the names of their customers, and companies hesitate to publish employee lists.

Even though some gaps and problems remain, knowledgeable observers expect prompt resolution. They predict computer and office automation systems manufacturers will have achieved partial implementation of X.400 sometime this year and full implementation by 1987. Most electronic mail service suppliers are forecasting a 1987 or 1988 implementation.

Companies may still have to achieve compatibility with both X.400 and IBM's emerging DIA/DCA standard, but 1988 should see true interconnectivity among electronic mail systems.

HUMAN RESOURCE SOLUTION

Every day, 5 million employees worldwide rely on Integral Systems for payroll/personnel.

Today, Integral Systems is solving the needs of some of the most respected employers in the world. Industry leaders like Ford Motor Company, First National Bank of Chicago, Taco Bell, Harvard University, the State of California and over 400 prominent organizations worldwide.

The system provides managers with an instant information source. It addresses everything from equitable compensation to flexible benefits and payroll processing. The program is modular so you can use the components individually or integrate them into a powerful human resource system.

Our reputation as a leader in the industry has been earned over thirteen productive years working exclusively on Human Resource Management Systems. We under-

stand the problems of companies with 250 employees or more and we provide solutions that help you make better decisions and manage with greater expertise.

To help make your decision, call our toll-free number for a fact-filled brochure. In the U.S., call (800) 824-8199. In California, (800) 824-8198. Locally and in Canada, (415) 939-3900.

HARDWARE - IBM Mainframes, PC's and the IBM System/38.

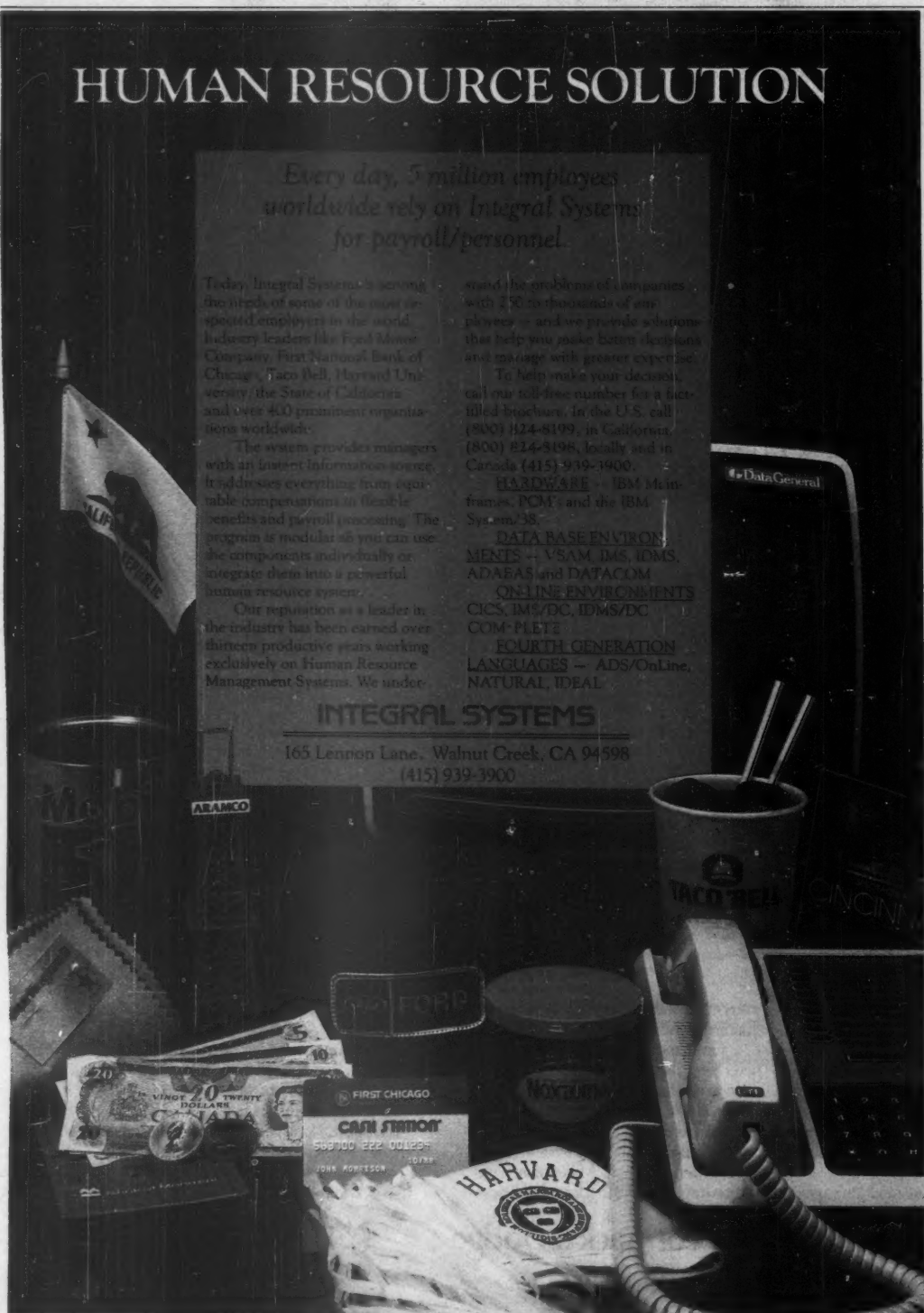
DATA BASE ENVIRONMENTS - VSAM, IMS, IDMS, ADABAS and DATACOM.

ONLINE ENVIRONMENTS - CICS, IMS/DC, IDMS/DC, COM-PILE.

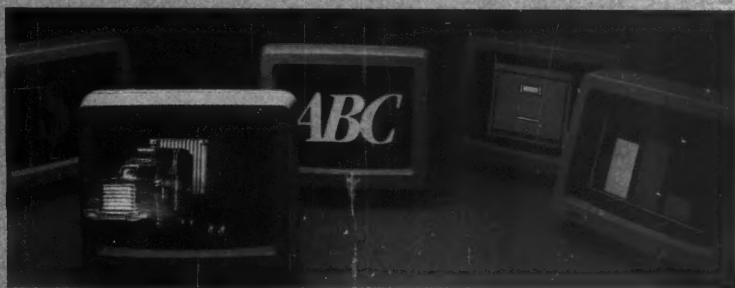
FOURTH GENERATION LANGUAGES - ADS/OnLine, NATURAL, IDEAL.

INTEGRAL SYSTEMS

165 Lennon Lane, Walnut Creek, CA 94598
(415) 939-3900



Digital has it now.



The first open-ended multi-user software system that integrates your custom application with a full range of standard business programs.

The A-to-Z™ Integrated System for MicroVAX II™ and MicroPDP-11™. Now you can integrate any number of your custom multi-user applications with word processing, graphics, spreadsheet, data management, accounting, and thousands of VAX™ and PDP-11 programs. Same menus, commands and files with no need for a system manager.

Tell me about A-to-Z on MicroVAX™ and MicroPDP-II™ ☐ Reseller ☐ Developer

Name _____ Title _____

Company _____ Phone _____

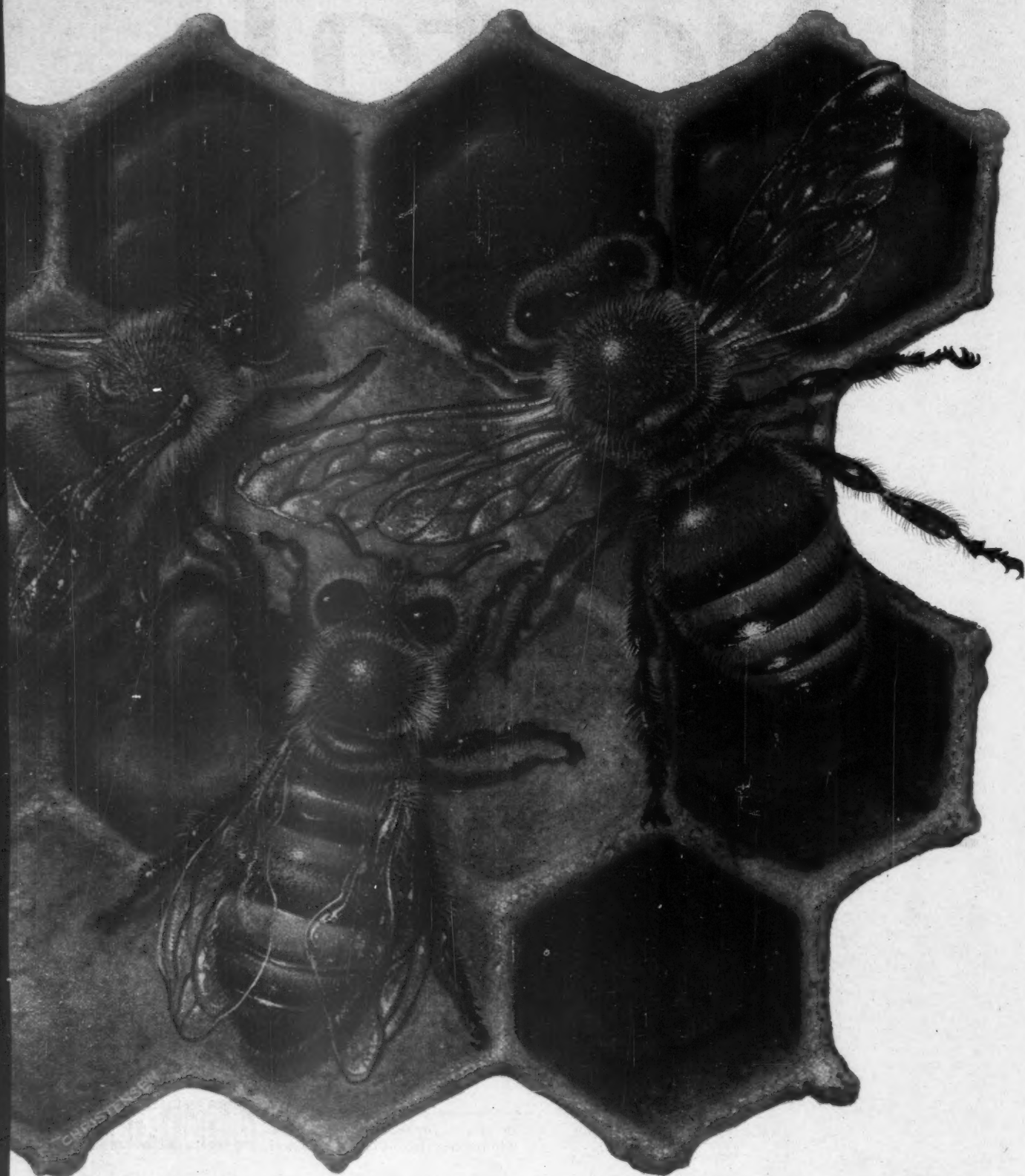
Address _____

City _____ State _____ Zip _____

Send to: Digital Equipment Corporation, Inquiry Dept.,
NR02-1/H3, 444 Whitney Street, Northboro, MA 01532.

digital™

SOPHISTICATED ARCHITECTURE



Naturally sophisticated forms are usually based on simple ideas. Ideas that seem obvious after the fact. The kinds of ideas that defy conventional thinking, or lead to maximum performance from minimum means. Ideas like combining the technology of multiple 32-bit micro-processors with mainframe architecture and concurrent on-demand operating systems capability.

That kind of thinking led to a very fast, very powerful and very affordable super micro-computer.

The MPS020-2™

It's from Icon and Sanyo.*

Icon is a market-driven, free thinking bunch of American engineering entrepreneurs, and Sanyo is a six billion dollar industrial giant from Japan. This combination gives you market sensitive engineering and service from us, plus rigorous testing, inspection and quality conscious manufacturing from Sanyo.

It's the best of both worlds.

Our natural division of labor saves your time and power. Our Central Processor isn't burdened with file management responsibilities. It manages user programs, terminal activities and executes its segment of the operating system. In parallel with the CPU is the Floating Point Co-Processor. It crunches the big numbers.

Meanwhile, the Disk Cache Processor is lining up information needed for high speed operation. This process of disk caching overcomes slow disk performance and contributes to a continuous operation with zero wait states.

We call this division of labor MultiMicro/Mainframe™ architecture. It's a sweet combination that gives you unmatched price/performance.

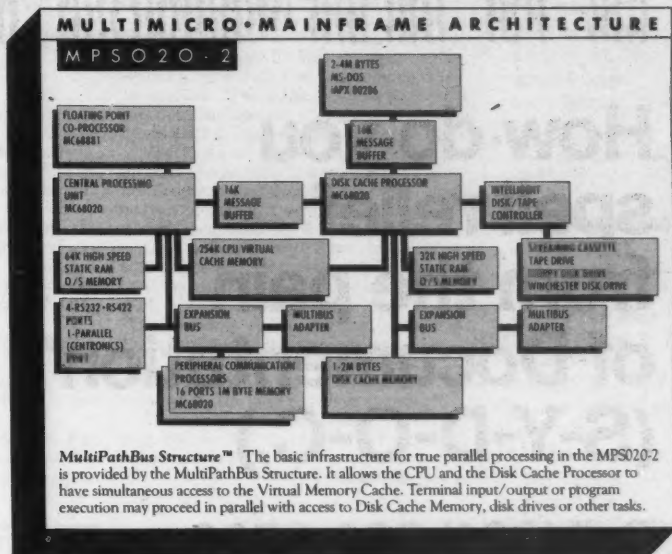
We've brought together what most keep separate. Operating systems. Our concurrent on-demand operating system means you don't have to base your applications software future on a single programming decision.

If what you have, or what you need in the way of software, runs on Unix or MS-DOS (plus other operating systems that will soon be available), it will run on the MPS020-2*. Wouldn't this simplify your life?

Don't get stung by a system that gives you less for more. Our approach is different. More for less. More users, more power, less money. Power enough for 32 users, each with a gigabyte of virtual memory. This is coming from two concurrent processors, both rated well over 1.5 MIPS. For this you'll have to store away far less than you'd expect.

Icon may change the way you think of the future.

If so, give us a buzz. 801 225-6888.



VARS ONLY

Do you deliver business solutions at a profit?

If the basics of your business is selling, service and financial capability, we can help you improve. Our assistance program for VARS includes shared expertise in sales, marketing, strategic planning, end-user support, software standards, horizontal and vertical application software and the most competitive price/performance multi-user hardware in the business.

If you're interested in selling more solutions at a profit, then plan on attending one of the Icon/Varnet® Opportunity Seminars listed below. Call us for a reservation.

SEMINAR SCHEDULE

April 16	Phoenix
April 25	Denver
April 28-30	Atlanta
May 6	Dallas
May 7	Los Angeles
May 13	Cleveland
May 14	Detroit
May 15	St. Louis
May 20	Fort Lauderdale
May 21	Houston
May 22	San Francisco
May 28	Washington, D.C.
May 29	Philadelphia
June 3	Boston
June 4	New York City



ICON ICON SYSTEMS AND SOFTWARE, INC.
A MEMBER OF THE SANYO GROUP

Icon, MPS020-2, MultiMicro/Mainframe and MultiPathBus Structure are trademarks of Icon Systems and Software, Inc. Sanyo is a trademark of Sanyo Electric Co., Ltd. Unix is a trademark of AT&T. APX 80286 are trademarks of Intel Corp. MS-DOS is a trademark of Microsoft Corp. MCA8020, MCA881 are trademarks of Motorola, Inc. VARNET is a trademark of Tyne Systems Limited. © Copyright 1988 Icon Systems and Software, Inc.

NEEDS

How do you spell relief from the pain of Documentation? (S-Y-D-O-C.)

Call (201) 930-9700.

Cut your COBOL
Maintenance
costs.

SYDOC:
STRUCTURED
DOCUMENTATION
SYSTEM FOR OS/VS

syncsort
INC.

Syncsort Incorporated 50 Tice Boulevard, CN18, Woodcliff Lake, N.J. 07675

QUESTION: Which is a bigger headache? The COBOL-documentation problem or the high-cost-of-maintenance problem?

ANSWER: Both.

* * *

We're not kidding. Documentation and high maintenance costs are both parts of the same big headache. Here's why:

1. THE PROBLEM BEGINS WITH DOCUMENTATION:

And it begins right at the program-development stage.

Most programmers hate to document. And although they may think they are producing well organized programs, they really have no way of judging. If they produce badly organized programs, they will inevitably produce badly organized documentation, too. One always equals the other.

2. BAD DOCUMENTATION LEADS TO COSTLY MAINTENANCE:

Even if the documentation started out being accurate, it's probably never been updated. When modifications occur, someone's got to go back and attempt to divine the underlying logic before new code can be inserted. A long and costly operation.

No wonder COBOL maintenance may consume as much as 75% of your entire budget!

FAST-RELIEF WITH SYDOC: Our Structured Documentation System takes the documentation problem off the shoulders of your programmers and puts it where it belongs—on the computer:

• **SYDOC HELPS YOU DEVELOP STRUCTURED PROGRAMS.** It not only provides structured documentation, it is also a very useful guide for the production of structured COBOL programs. Flaws and inconsistencies can be spotted at the development stage. And corrected before they start driving your maintenance costs up.

As a manager, you will—for the first time—have a tool to standardize both your documentation and the quality of your programs.

• **SYDOC MAKES IT EASY TO MODIFY EXISTING PROGRAMS.** It can analyze "orphan" programs without adequate documentation and tell you everything you need to know about the program's structure, logic, variables and relationships. Armed with this knowledge, the maintenance problem shrinks.

No longer is it necessary for skilled programmers to spend days searching for clues about the program's logic. SYDOC makes all necessary information available quickly and easily.

But the best way to find out about SYDOC is to try it. If this remedy doesn't work you'll just have to try another—
A-S-P-I-R-I-N.

SOFTWARE & SERVICES



SOFTLINE
Maura McEnaney

Secret society: Pick a winner

Although last month's International Spectrum show in Las Vegas was abuzz with talk of legal battles between Pick Systems and vendors of the Pick-based systems [CW, March 31], users and vendors were much more willing to talk about the growth of Pick installations and its migration into the corporate marketplace.

In its 21-year history, the Pick operating environment has attracted a dedicated group of users, drawn to the system for its Unix-like portability and its data base management capabilities. More than 2,000 software application packages have been written for the Pick system, which has approximately 60,000 multiuser system installations. But, according to San Francisco-based consultant Chandru Murthi, "Until recently, Pick has been a very well-kept secret."

If Pick ever was a secret, users and developers are working to get the secret out. Users were among those touting Pick at the show. "The data base retrieval capabilities make it ideal for business applications because it allows nontechnical people, with very little training, to retrieve data from the data base reasonably effectively," said Robert Clearfield of the Delaware Valley Underwriting Agency, Inc.

Manufacturers also said Pick needs a boost. Through the Spectrum Manufacturers Association, formed last year, manufacturers of Pick-based systems are establishing a set of standards for Pick implementations that they hope

See **SECRET** page 44

McEnaney is a Computerworld West Coast correspondent.

Glitch causes underbilling

Pacific Bell blames lost revenue on program error

By **Jeffrey Beeher**

SAN JOSE, Calif. — A regional telephone company that failed to bill its customers for more than \$35 million in long-distance calls traced the accident recently to a logic error in a rewritten switching system program.

Between Jan. 13 and March 14, the faulty rewrite reportedly allowed more than 1.6 million Californians to conduct \$29.3 million in long-distance traffic over Pacific Bell Telephone Co. and AT&T facilities without being charged.

Billing omissions also occurred regularly between Nov. 27 and Jan. 12; that revenue loss to Pacific Bell alone totaled \$6.2 million, according to a company spokesman.

During the same period, AT&T was also shortchanged, again by millions of dollars, although the exact amount of the financial

error has proved difficult to reckon.

Pacific Bell plans to back bill callers for the long-distance charges it has failed to collect since Jan. 13. But the \$6.2 million revenue shortfall that accumulated between Nov. 27 and Jan. 12 is irretrievably lost because internal company policy prohibits back billings of longer than 60 days.

The roots of Pacific Bell's worst-ever billing mess go back to a comparatively minor programming change that was prompted by a recent shift in Federal Communications Commission regulations.

Until recently, the firm routinely exempted its customers from paying for calls lasting one second or less, the spokesman said. But then came a new FCC regulation that required phone companies to raise their no-bill time limit to two seconds.

In effect, the spokesman said, "the change gave callers an extra second of access before the meter started running."

To comply with the revised FCC regulation, Pacific Bell was forced to rewrite the programs that control its electronic and

See **GLITCH** page 44

NEW THIS WEEK

- Cadam, Inc. offers Basicad front-end software to its Geometry Interface Module

■ For more on this and other new products, see pp. 87-108.

INSTANT ANALYSIS

"Usually it's applauded when a competitor screwed up. . . . But that's not true in our industry. The shortcomings of one cause problems for many of us."

— Walter Williams, president of General Electric Information Services Co., speaking to members of ADAPSO earlier this month

SOFTWARE NOTES

Warehouse expert system announced

John Landry, former McCormack & Dodge Corp. executive vice-president and now chairman of **Distribution Management Systems, Inc.**, Lexington, Mass., recently said his company will soon be bringing out a commercial application that will incorporate a **series of expert systems** for warehouse distributors.

The package is expected to be ready for alpha test by June, he told attendees at an artificial intelligence session of the recent ADAPSO conference in Houston.

The package will be one of the first commercial expert systems capable of

See **NOTES** page 44

Excelerator aids Stradis adoption

By **Eddy Goldberg**

MELVILLE, N.Y. — An automated graphics tool has proven an effective means of boosting acceptance of a structured development methodology among computer systems users in the Long Island DP headquarters of the \$9 billion National Westminster Bank USA.

When the company's Development Support Center decided to implement the concepts embodied in Stradis, a systems development methodology from McDonnell Douglas Automation Co., for the system department's 125 programmers and analysts, Systems Officer Clare O'Brien knew there would be resistance to the many handwritten forms and diagrams required by Stradis. In late 1983, she agreed to a trial use of Excelerator, a graphics tool from

See **EXCELERATOR** page 43

Brush Up On MITROL 4GL

...by attending a seminar on Mitrol's fluent and fertile fourth generation language, MITROL 4GL. Call (617) 933-9546



Mitrol.
The Fine Art of Information Management.

World Headquarters, 800 West Cummings Park, Woburn, MA 01801 (617) 933-9546
Mitrol Incorporated, in partnership with Teamco Systems Innovation in Holland.

ADR/THE LIBRARIAN. IT TELLS IT LIKE IT WAS.



*"I know this may be an awkward time,
but do you recall him ever mentioning source code?"*

It's the middle of the night. The phone rings. One of your programs has just blown up. Come and fix it.

The trouble is, most programs get changed, patched and doctored so often that finding the problem is like trying to find the proverbial needle in the haystack.

That's what makes ADR/The LIBRARIAN® such an important piece of software.

ADR/The LIBRARIAN is the only system that keeps track of all your company's programs on-line and documents every change that's been made. Automatically. Across all IBM operating environments.

So with ADR/The LIBRARIAN, you have an on-line audit trail that lets you know what changes were made, who made them and when they were made. All the way back to day one.

And ADR/The LIBRARIAN also allows you to restore any prior version of a program. Easily. So if you can't quickly fix a program that doesn't work, you can always run a previous version you already know works.

But ADR/The LIBRARIAN is too smart to store redundant copies of a program. It keeps only one, along with all the changes. So it uses less disk space.

To keep problems from happening, ADR/The LIBRARIAN helps you monitor and control changes to make sure the proper ones get completed, tested and documented. And that only the authorized people make those changes.

And since ADR/The LIBRARIAN supports data sharing across operating systems, users working in different environments have easy access to the same ADR/The LIBRARIAN files. And you have a single point to control all those files.

Simply put, ADR/The LIBRARIAN can make your data processing life much easier. Because it helps you keep your programs' pasts from coming back to haunt you.

For more about ADR/The LIBRARIAN, mail us the coupon. Or call 1-800-ADR-WARE.

ADR WE KEEP WRITING THE
HISTORY OF SOFTWARE
AN AMERITECH COMPANY

Applied Data Research® Orchard Road & Rt. 206, CN-8,
Princeton, NJ 08540 1-800-ADR-WARE. In NJ, 1-201-874-9000.

- ☐ Please send me more information about ADR/The LIBRARIAN®
☐ Please have an ADR® Representative call.

Name _____ Position _____
Company _____ Phone _____
Address _____
City _____ State _____ Zip _____
Computer Equipment _____

CW 4 21 88

For information about ADR Seminars call 1-800-ADR-WARE.

IBM is a trademark of the International Business Machines Corp.

© 1988 ADR

SOFTWARE & SERVICES

Excelerator aids adoption

From page 41

Index Technology Corp. of Cambridge, Mass.

"We looked for a computer-aided graphics package to make the methodology of Stradis more attractive for users to pick up," O'Brien said. "Without the graphics package, putting data flow diagrams down on paper would be a tough pill to swallow."

Adopting the Stradis methodology was O'Brien's attempt to bring order and control to "many different projects going off in many different directions." Automating the creation and modification of the detailed, hand-drawn data flow diagrams that would result from using Stradis' methodology would accelerate acceptance of the product, O'Brien reasoned.

But Stradis did not have its own automated graphics package at the time, and O'Brien had to search out other vendors. She looked at a product from Nastec Corp., but she said that in late 1983 it used too many keystrokes and required dedicated hardware. She wanted to keep her options open.

"It was a big investment. If Excelerator was not as useful as we had hoped, at least we would have the PCs left," O'Brien said. The bank is running Excelerator on stand-alone IBM Personal Computer XT's with 640K bytes of memory and 10M-byte hard disks.

Supports analysis

Dick Wilson, vice-president and head of Applications Planning at the bank, said that Excelerator is used to support analysis for developing the bank's mainframes' systems. "In the up-front, early stages of a DP project, we do the analysis on the PCs."

The bank does not use Excelerator to develop Cobol programs. He said it is used to do some design work when deciding what the system is going to look like.

Wilson said the chief benefit, in his eyes, is consistency during project development. "Each project was doing its own documentation. A tool like Excelerator makes it more convenient to do documentation the same way every time, increasing standardization."

Excelerator's mouse-driven graphics and menu-based user interface were big selling points, both in purchasing the product and in encouraging the bank's employees to use it. "Once people get the hang of it, they really like it. You almost intuitively start doing more when you think in more

graphic terms," O'Brien said.

Because diagrams are created more easily with Excelerator, programmers and analysts are more likely to commit design ideas to writing. Wilson said DP employees now tend to do the kind of documentation they had not done before because it was too complex.

More experimentation in design is done using Excelerator before trying to code programs. And changes are made more willingly when it

only takes a few movements with a mouse.

Communication during the analysis and design process is also improved with Excelerator. System users and designers can sit in front of a screen and make data flow diagrams that can be altered as they work. This speeds development time and catches potential problems as early in the development cycle as possible.

Another benefit of having automated data flow dia-

grams is that they can be retrieved and modified for different audiences.

O'Brien pointed out that Excelerator is also being used by other types of employees within the bank. Secretaries use it to create organization charts, and managers and analysts use it to prototype systems design.

Wilson said he used Excelerator to make a floor plan to show where computer terminals should be located. "People are being very cre-

ative in how they use the tool," he said.


The bank currently has a total of 13 copies of Excelerator in its New York and Long Island offices.

One of the results of the bank's use of Excelerator is that more people are using microcomputers.

"The growth of PCs here is definitely a by-product of Excelerator. Once it got in, more and more PC packages began popping up on the hard disk," O'Brien said.

Fujitsu's 2400 bps modem.

The most reliable way to get your point across.



We've been building modems that get the message through for 20 years. Our extensive experience pays off for you with total dependability. To ensure that reliability, the Fujitsu modem is built around custom LSI's that provide a compact unit with exceptional uptime.

It also has exceptional features. Like automatic calling and answering, which save you time and effort. And two-wire full-duplex operation so it can send and receive at the same time.


The Fujitsu modem uses both synchronous and asynchronous modes so it can give you more information by connecting to more computers. And it's CCITT V.22 bis compatible.

The most reliable modem is also fast.

The Fujitsu modem works fast—sending and receiving at 2400 bps, the ideal speed for office use. If the modem at the other end of the line is only capable of 1200 bps, the Fujitsu modem automatically adjusts to the slower speed.

An extended feature card supports the AT command set and connects to popular modem software.

To get right to the point, call us for the name of the Fujitsu dealer nearest you. 408-946-8777, Ext. 2377.



FUJITSU

FUJITSU AMERICA, INC.
DATA PRODUCTS DIVISION
1055 ORCHARD DRIVE
SAN JOSE, CA 95134

SOFTWARE & SERVICES

Glitch causes underbilling

From page 41

electromechanical switching systems. But, in so doing, the firm inadvertently introduced a logic error that led the switching systems to treat 12% of their three-second-or-longer phone calls as if they had lasted only two seconds or less.

Apparently, the switches chose to drop or record calls randomly. "Some of the dropped calls lasted only three seconds and others three hours," the spokesman said.

The billing omissions went undetected for more than three months. Pacific Bell began to grow suspicious in mid-March, when it compared the volume of calls that were billed with the number completed and noticed a serious discrepancy.

An investigation uncovered the program logic error, which was apparently confined to the company's electromechanical crossbar switches, the spokesman said.

In part, the bug probably resulted from the relative difficulty of writing programs for electromechanical switching systems, which incorporate much older, less sophisticated technology than state-of-the-art electronic switches, he added.

Another factor may have been a shortcoming in Pacific Bell's software development or testing procedures.

"Although we tested the billing program after we finished changing it, we had no real safeguard in place to spot a potential error in logic," the spokesman said.

But whatever the cause of the faulty rewrite, Pacific Bell has corrected the glitch to "make sure the same billing problems never happen again," he said.

Notes: ADR cuts prices

From page 41

running on standard mainframe computers.

In response to IBM's offer of free use of DB2 for six months, **Applied Data Research, Inc.** has cut its monthly charge for the **OS version of Datacom/DB** to put it more in line with IBM's pricing, according to Ann Morley, editor of International Data Corp.'s "Software Watch." A 3-year license costs \$3,975 per month, and a 5-year license costs \$3,735 per month, she said.

Sperry Corp. has acquired **Foundation Computer Systems, Inc.**, the owner of the **Ally** software package. Sperry spokesmen say they wanted Ally as a companion package to their Mapper application generator.

Pansophic Systems, Inc.'s graphics and decision-support software is now being sold through **Data General Corp.'s Independent Software Vendor program.** Packages include **D-Pict** graphics and **Ingot** decision support to run on the **DG 32-bit Eclipse**.

WHEN IT COMES TO BUILDING WIDE-AREA NETWORKS, THERE'S NO SUBSTITUTE FOR EXPERIENCE.

While any number of companies can offer to sell you a private wide-area network, one company can offer you 25 years of computer and communications experience along with it. **BBN Communications.**

Experience that includes designing and building the world's first packet-switching network for the U.S. government back in 1969. Since then, it has evolved into the world's largest wide-area network, the **Defense Data Network**, connecting over 30,000 users throughout the world.

But the U.S. Government isn't the only customer with tough networking problems that BBN has helped to solve. Numerous major corporations, among them **Wang**, **Weyerhaeuser**, and **MasterCard**, not to mention European giants like **England's National Westminster Bank** and **Italy's largest corporation, ENI**, have also found the answers they were looking for from us. Each came to BBN with a unique networking problem—from integrated voice/data transmission to electronic mail to credit authorization—and each came away with a unique networking solution.

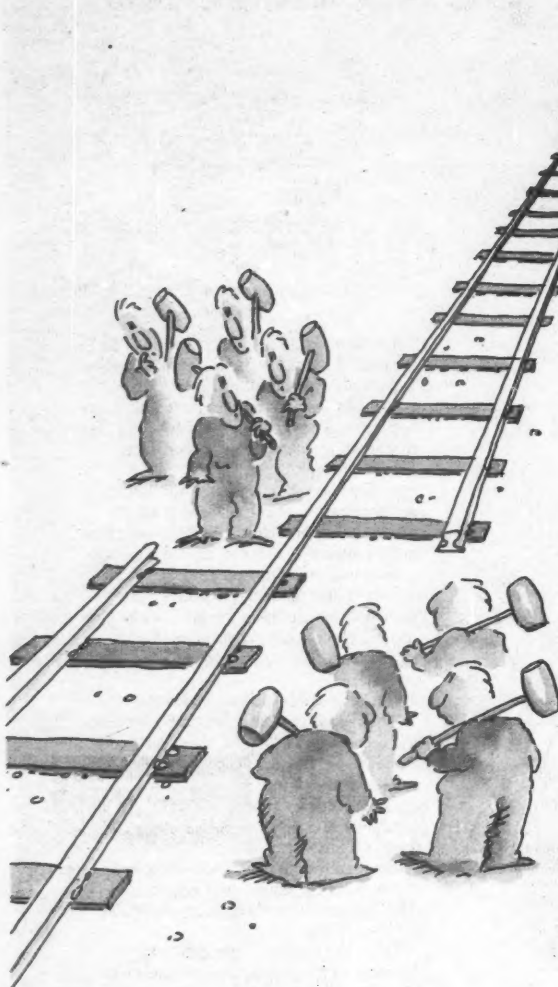
If you're going to make a major commitment to a wide-area network vendor, only three things count. Experience, experience, and experience. In wide-area networking only one company delivers it all.

SHOULDN'T YOU BE TALKING TO BBN?

BBN Communications

A Subsidiary of Bolt Beranek and Newman Inc.

70 Fawcett Street, Cambridge, MA 02238
Telephone 617-497-3268 Telex 921470



Secret society: Pick a winner

From page 41

will mean increased installations of the operating environment in the corporate DP departments.

Pick Systems founder **Dick Pick** said that in order for his operating system to be embraced by corporate MIS departments, the system must be ported to both mainframes and microcomputers.

Pick initiated the move into small systems with the introduction of an **IBM Personal Computer XT and AT** version, but that in itself was not enough.

"Pick's move into the corporate mainframe world is just beginning," consultant **Murthi** said.

The **Ultimate Corp.** of **East Hanover, N.J.**, is banking on the acceptance of **Pick** in that larger market with the recent introduction of **Pick** on an **IBM 4300 series**.

With implementations of **Pick** on systems like **Digital Equipment Corp.'s VAX machines** and **Ultimate's** added networking capabilities, **Pick** systems may be starting to get off the ground, **Ultimate President Ted Sabarese** said.

Whether **MIS** departments take to the system remains to be seen, **Sabarese** said. "It's just a question of a slow, hard sell."

Product Spotlight

Edited by Barbara Wierzbicki

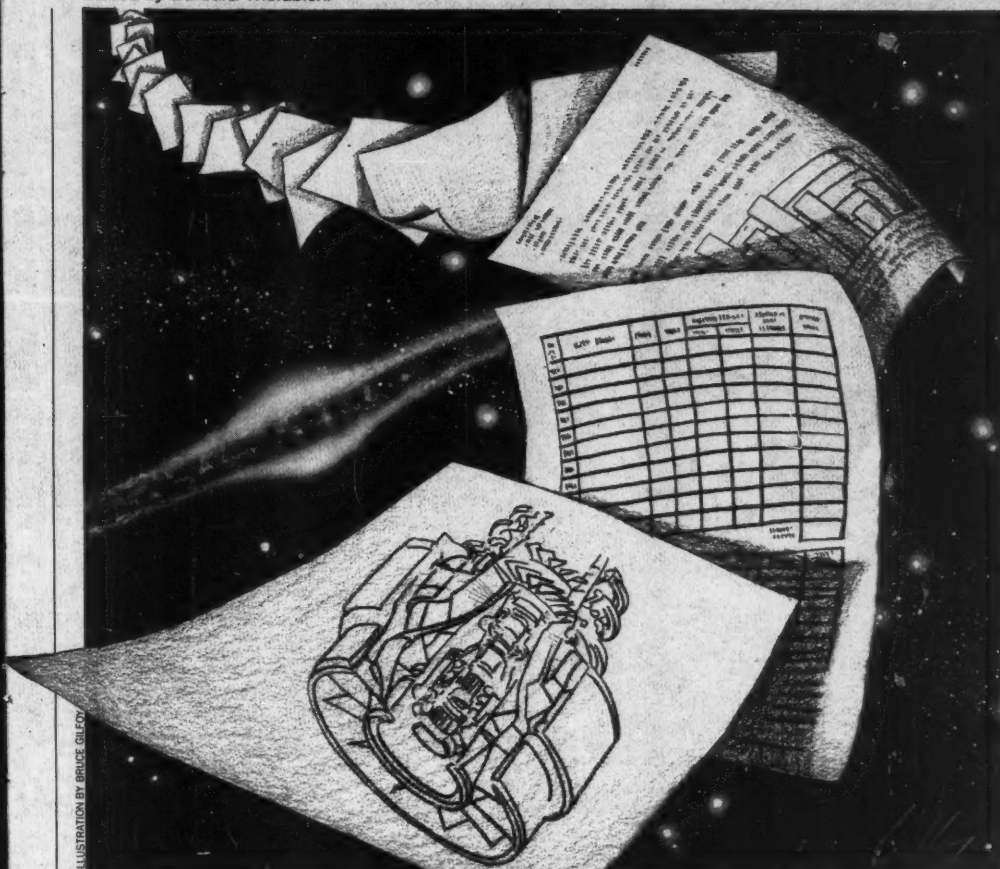


ILLUSTRATION BY BRUCE GULEV

Page printers

For speed and volume, now is the time to buy

By AMY SOMMERFELD

The printer industry may be the latest example of entropy. As the universe expands, disorder grows.

Choosing a printer is not as easy as it used to be. No longer an insignificant output device at the end of a chain of office automation equipment, today's sophisticated page printers actually generate applications, letting users perform tasks previously done by an outside service — such as typesetting and overhead transparencies — or never performed at all, such as graphics illustrating reports, typeset newsletters and so on.

This changing market, replete with vendor price/performance battles and overlaps in printer technologies, makes purchasing choices tougher than ever. And because page printers are complex devices with many serviceable components and their own storage, processors and even programming languages, it is increasingly difficult for DP managers to treat these devices as commodities or to leave them to end-user departments to specify and service.

The seemingly infinite purchasing possibilities,

coupled with the rush of vendors that began selling page printers during the past 12 to 24 months, do have a positive side effect: The page printer segment now edges toward being a buyer's market. After some years of fanfare, this market has finally ripened enough to make it a safe bet for many users.

"The market has changed dramatically, and most of the major players are already involved. We have seen a lot of headway, and we will see more. But products you buy today will not be obsolete tomorrow," says Maureen McManus, product marketing manager at C. A. Pesko Associates, Inc., a consulting firm based in Marshfield, Mass.

Current page printer offerings include low-end models costing from \$2,000 and \$3,000 up to about \$10,000, printing 8 to 12 page/min, fitting comfortably on a tabletop and emulating popular impact devices for easy interfacing. High-end models can print 100 to 200 page/min, loom as large as a mainframe — one vendor boasts a printing system 16 feet long — and cost several hundred thousand dollars.

In the current trend, many vendors offer product lines that span much of the spectrum from

INSIDE

Page description languages: A layman's tool for creating complex images simply/45

Forms overlays: mechanical/optical vs. electronic/54

Comprehensive page printer chart/56-66

'The market has changed dramatically. . . . We have seen a lot of headway, and we will see more. But products you buy today will not be obsolete tomorrow.'

Sommerfeld is a Computerworld associate editor.



DATA GENERAL ASKS: ARE YOUR ENGINEERS OPERATING AT A HANDICAP?

**GIVE THEM TOTAL
RESOURCE-SHARING WITH TEO™
THE FIRST COMPLETE
INTEGRATED ENGINEERING
ENVIRONMENT.**

Take the blinders off your engineering and development operations. With a systems solution that affordably integrates hardware, applications, advanced office automation and personal productivity tools in a shared environment.

Data General's Technical Electronic Office (TEO) integrates technical applications software with our industry-leading CEO® office automation. And our AOS/DVS™ distributed operating system allows you to tap all the power and responsiveness of your entire

computing resources from each workstation.


It's just one of Data General's total solutions for industrial and business automation. A solution that lets engineering workstations, superminis and servers work together as a single resource.

Only Data General gives you AOS/DVS or your choice of enhanced UNIX™ environments on a full range of compatible processors, from our new DS/7000™ family of

workstations to the new standard for superminis, the Data General MV/20000™. And our commitment to industry standards lets you integrate your current mainframes. Easily expand your network. And protect your investment.

Learn more about Data General's integrated solutions. Write Data General, 6300 So. Syracuse Way, Englewood, CO 80111. Or call 1-800-DATAGEN (in Canada call 1-800-268-5454).



 **Data General**
a Generation ahead.

© 1986 Data General Corporation, Westboro, MA. CEO is a registered trademark and TEO, AOS/DVS, DS/7000 and MV/20000 are trademarks of Data General. UNIX is a trademark of AT&T Bell Laboratories.

Product Spotlight/Page Printers

Printer mart: Now is the time to buy

Continued from page 45

high end to low. Each page printer consists of three subsystems: a printing engine that puts the image on the page, control electronics that determine the imaging capabilities and software. Vendors vary any of these subsystems to provide a diverse product line. The diversity of models offered means any one company may use page printers for personal computer printing, for departmental output and for centralized DP printing.

At the low end, QMS, Inc. introduced a stripped-down laser model, the Kiss ("Keep it smart and simple"), for just \$1,995 at last year's Comdex/Fall '85 show, and Hewlett-Packard Co. reduced the price of the leading low-end page printer, the Laserjet, to \$2,995. Apple Computer, Inc. also reduced the price of its popular low-end laser printer, the Laserwriter, to make room for an upgraded Laserwriter Plus. For their part, the high-end models' prices are coming down slightly as the mid-range 60 to 80 page/min page printers' price/performance adds pressure.

With the technology for print engines — including laser, LED array, magnetic and ion deposition — re-

maining fairly stable, the vendors' chief vehicles for innovation and attracting customers lie in the electronic subsystems and printer software. In many instances, users can purchase just the speeds they need and just the features they want, with service contracts to boot.

Touted applications include more sophisticated graphics, dozens of fonts available on-line, mixed text and graphics, plotting, electronic forms overlay, digitized signatures or logos and what-you-see-is-what-you-get printing. Envelope feed, printing on transparencies plus sorting, collating and job separation all number among the accessory features.

Across the board, reliability has improved in the past 12 to 24 months. Excessive downtime and preventative maintenance with the high-end laser models scared many users away from even considering these models or their low-end cousins. But stories of full-time laser printer baby-sitters fade away as

vendors make the change to sturdier, mass-produced and fewer parts.

The trend now runs toward user-serviceable print engines with replaceable toner and drum cartridges. Even some of the high-end machines are sold with maintenance kits for in-house servicing. As newer models

see more use, vendors raise their conservative mean-time-between-failure ratings and suggested print volumes to match user field experience. Many buying criteria apply to the entire range of page printers as vendors from high end to low end aim to offer the same popular features.

— Jim Minervino
International Data Corp.

Page printers rarely live up to their rated speeds. 'The rated speeds for page printers is like mileage achieved while your car is coasting down a steep hill.'

First and foremost, page printers appeal to users because they print high-quality type. Most page printer output is considered letter-quality for business use, although it does not duplicate output from a typewriter or daisywheel. On the plus side, the fonts produced by many page printers mimic typeset lettering and also allow more type to fit on each page, potentially saving companies money in paper costs.

On the minus side, some users complain that the type produced by laser printers is shiny and somewhat raised — a giveaway that the document was neither typed nor typeset. But in a business environment where highly automated office work has become nearly synonymous with good management, receiving a document produced by a computer may now carry connotations of sleek technology and sound management instead of implying impersonal, form letter correspondence.

Vendors measure letter quality objectively in the number of dots per inch for text and graphics. Early models offered clear, acceptable type at 240 by 240 dot/in., while many recent models offer 300 by 300 dot/in. For both high-speed and desktop models, this resolution seems to fit general-purpose requirements for letter-quality text.

Typesetting and in-house publishing on a professional level may require resolutions up to 1,000 by 1,000 dot/in. and higher, but demand for this level of crispness remains low.

Most users cannot immediately distinguish the two resolutions, and since each dot represents a bit of data, the storage and transmission problems associated with increasing the amount of data exponentially to improve resolution will restrict demand for higher resolutions to niche

Continued on page 50

Why does the
Bank of Tokyo, Ltd.
have a yen
for Zeke:



Zeke automated scheduling is worth a fortune to The Bank of Tokyo, Ltd. "We've found that Zeke eliminates the possibility of out-of-order submissions and other errors," says VP/Electronic Data Processing Systems Department Manager Kazuhiro Kobayashi. "It takes the burden of individual submission off our operators.

"Zeke allows us to utilize our CPUs to the fullest."

Faster throughput. Fewer reruns. Greater productivity. Zeke works for The Bank of Tokyo, Ltd.

Why not put Zeke to work for you?

ZEKE
The scheduler that works.

SOUTHWEST SOFTWARE
Software that works.

813 Great Southwest Parkway Arlington, Texas 76011-5428
(817) 640-8911 (answered 24 hours a day) 1-800-227-7774 (outside Texas)

WE SPEAK FLUENT IBM.

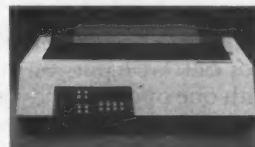
Whether the language is 3270 or System 34/36/38, Datasouth dot matrix printers out-perform the IBM printers they emulate. And they do it without external protocol conversion devices.

That means you can plug our TX 5180 or TX 5220 printers directly into your System 3X using a standard IBM twin-axial connector.

Datasouth's CX 3180 and CX 3220 printers attach directly to IBM 3274/3276 Cluster Controllers or 4331 Display Printer Adapters using the IBM type "A" co-axial connector.

All four printers also include a Centronics-type parallel interface, so you can share them between the larger system and an IBM PC.

So whether you're looking for a 180 cps data workhorse, or a multi-mode 220 cps printer, nobody speaks IBM more fluently, at a better price. Not even IBM.



IBM is a registered trademark of International Business Machines Corporation.

Datasouth
AMERICA'S HIGH PERFORMANCE
PRINTER COMPANY

Datasouth Computer Corporation • P.O. Box 240947 • Charlotte, NC 28224
704/523-8500 • Tlx 6843018 DASOU UW • Sales: 1/800/222/4528 • Service: 1/800/438-5050

GO FOR IT

The Supermini Real-Time Benchmark Challenge

Take your best shot

We're throwing down the gauntlet and challenging you to challenge the best. If you're evaluating high performance supermini systems, **demand a benchmark.** Try the parallel processing power and awesome real-time efficiency of our 3280 MPS against the other guys. Read on and we'll tell you how to set it up today. But first, take a look at what they'll be up against.

The 3280 has:

- As low as \$26K per MIP
- Easy expansion
- Up to 33 MIPS
- Growth without replacement
- High availability
- Low life-cycle cost
- 64 MB/sec. bandwidth

And if that doesn't impress you, check out these High-End Supermini price performance numbers:

	Concurrent Computer Corporation 3280MPS	DEC 8600	DEC 8650	DEC 8800
Entry-Level System Price	\$250,000 to \$860,000	\$350,000	\$475,000	\$650,000
Performance in MIPS*	6 to 33.8	4.7	6.9	11.3
\$K/MIP	\$40.7K to \$25.5K	\$74K	\$68.8K	\$57.5K

List prices are for processor only or entry-level configurations.
* Single precision whetstones.

The truth is the proof

We're putting the test of real-time on the line.

All you have to do is fill out the coupon or call. We'll put you in touch with one of our worldwide benchmark centers. They'll show you how the 3280 MPS is making real-time performance history by meeting the toughest real world challenges.

We're ready for your challenge of the 3280 MPS. When we win... you win!

The 3280 MPS from Concurrent Computer Corporation. To take the 3280 MPS challenge, or receive more information, mail the coupon. Or call toll-free: 1-800-631-2154.



I'll go for it.

Name

Title

Company

Address

City State Zip

Phone ()

Application

Mail to: Concurrent Computer Corporation,
Two Crescent Place, Oceanport, N.J. 07757.

CW042186

Page description languages help users merge text, graphics

By SHERRY LEE HERRING

Until a few years ago, the most sophisticated page description languages were the text formatting routines used for letter-quality printers and the slightly more complex character printing routines for dot matrix printers. All that had to be specified was a stream of characters, with occasional commands for indents, boldface and underlining and for starting new lines, new paragraphs and new pages.

However, the technology of today's computers allows the layman routinely to generate sophisticated images, drawings and business graphics as well as a wide variety of typefaces and sizes for conveying text — functions traditionally left to a professional page compositor. Modern dot matrix printers and nonimpact printers are now opening the door to exciting possibilities for putting graphics, mixed text and graphics, newspaper- or newsletter-style layouts, engineering and architectural drawings and more on paper.

Page description languages, software for graphically composing images on a page, are a must for anyone who wants to compose combination text and graphics output within one computer — vs. typing text, using a plotter and merging all in a mechanical pasteup environment.

Page description languages vary greatly, and one should be selected based on the intended application environment. Each language fills its niche based on the application, configuration of its system, number of users, desired output and so on.

A page description language requires an all-points-addressable printer — in other words, a dot printer. Being able to place dots in any location on a page to make charts and pictures is integral to the process and hence a fully formed character printer is not desirable.

Also, consider carefully the functions the printer supports: the speed required either in pages per minute or lines per second, the daily or accumulated monthly throughput, the mean time between failure of the printer components and their mean time to repair and the accessories that enhance or limit throughput.

The current trend toward making the language transparent to the user has not been fully achieved, and as such, a page description language's user friendliness remains heavily application dependent. Check with the hardware and software manufacturers from which you will be purchasing to determine the proper language and to ascertain its ease of configuration. Since page description languages are tailored for distinct applications, be sure to select the system's components to optimize efficiency.

Postscript from Adobe Corp. is a general-purpose page description language. Its greatest strength is that it is a device-independent language that allows it to drive low-end laser printers, demand printers and

phototypesetters off the same output code.

Postscript is especially good for office automation and word processing applications and for pages using a variety of fonts and graphics because of its ability to scale and rotate quickly, with a minimum of commands, through the use of outline font representation. It is excellent for making rough drafts of phototypeset manuscripts because it deals with text as if it were a graphic element.

Interpress, developed by Xerox Corp., offers applications in network communications with multiple systems and multiple print stations. It

uses bit-map fonts, where much memory is required, compute time is rapid and the best-quality output may be achieved.

Interpress is ideally suited for multiple-page manuscript preparation, allowing the user to describe a page with mixed text and graphics and offering rapid rework and repagination in a minimum of time. Another page description language, DDL by Imagen Corp., is being specified to address the processing of full documents with high performance and a high degree of functionality.

Reprint from Interleaf Corp. is targeted toward the publishing environment, where the ability to print

merged text and graphics with bit-map fonts produces documents ideal for limited production runs or proofing prior to final phototypesetting and production. It will also find many applications in the engineering workstation marketplace.

Other language software tools are better for plotter-oriented applications. GKS, a Graphics Kernel Set-based description language from GSS Corp., and Tektronix Inc.'s Plot 10 are especially suited for engineering drawings and computer-aided design, manufacturing and engineering applications because they work from a mathematically based, vector graphics command set.



Give Your PC A Kiss.™



Once you do, you'll fall in love.

KISS is the first intelligent laser printer that's both smart and simple. And at the unbelievably low price of \$1,995*, it's the perfect mate to any PC.

It's so sophisticated, you'll want to kiss your old daisywheel and dot matrix printers good-bye. KISS is ten times faster. And it's very quiet. It produces crisp, near typeset quality output at up to 400 characters per second. And it has its own cut-sheet feeder.

It lets you show your own style. It has nine resident fonts that you can mix on a single page, and even on one line. Imagine all that power packed in one little KISS.

Plus, KISS is smarter than your old printer. It works with WordStar®, Lotus® and any other software that will print to a Diablo 630®, Epson FX 80® and QUME Sprint®. At up to 6ppm KISS is unmatched in efficiency and versatility. Can you imagine your present printer performing like that? We can't.

KISS is from QMS. It's just one way we're meeting today's needs with proven technology. Now, wouldn't you like a KISS?

Call toll free, 1-800-245-KISS for more information. Or write: QMS INC., P.O. Box 81250, Mobile, Alabama 36689. One Magnum Pass, Mobile, Alabama 36608.

QMS
Print Systems With Imagination.™

Herring is manager of corporate communications at Dataproducts Corp., Woodland Hills, Calif., maker of mid-range laser printers.

* This price good in the domestic United States only.

WordStar is a registered trademark of Micropro International. Lotus is a registered trademark of Lotus Development Corporation. Diablo is a registered trademark of Xerox Corporation. Epson is a registered trademark of Epson America, Inc. QUME Sprint® is a registered trademark of QUME Corporation. ©1986 QMS® Inc.

Product Spotlight/Page Printers

Continued from page 47
markets for the foreseeable future.

Graphics are the second attention-grabbing feature. Page printing technology has an intrinsic ability to produce sophisticated graphics, because its line drawing capabilities are limited only by its resolution. Since the printers produce pages dot by dot, it is no more difficult technically to produce a computer-aided design and manufacturing masterpiece than a letter to the editor.

Software and storage hold the keys to graphics capability for page printers. The same powerful raster image processors that drive high-quality graphics terminals must create the graphics image digitally for a page printer to print. Software must translate the bar charts as well as the schematics off a low-resolution screen to an all-points-addressable page.

An 8½- by 11-in. page in 300 dot/in. could consist of more than 8 million dots, each represented by one bit of data. This is the size of the image that must be manipulated by the raster image processor and that must also be stored and transmitted from the host CPU.

Some page printers are fully capable of taking a simple data stream of video input from the host and converting it into a full-page, bit-mapped graphics image for printing. Others sidestep part of the difficulty by limiting either the resolution available for graphics — usually to half that available for text — or the size of the image it will print, so graphics can take up only one-quarter of the page, for example.

Printing a page of graphics slows page printers considerably: An 8 page/min machine might take two minutes for a complex page, or a 100 page/min machine might slow down to 20 or 30 page/min.

Potential buyers should be aware that for both text and graphics, page printers rarely live up to their rated speeds. The pages-per-minute rating accurately reflects the paper speed — how fast the printer can pull a page through its system — but does not include imaging time, the slowest stage, given current technology. Analysts predict it will not always be so, but today users can count on a significant delay for the first page out. Multiple copies of the same page will appear more quickly, but complex pages may never be printed at the rated speed.

Printer buyers may be familiar with this gap between rating and reality from the lines-per-minute and characters-per-second ratings of impact printers. The gap is often compared to automakers' highway mileage ratings for cars — useful for comparison only. "But the rated speeds for page printers is like mileage achieved while your car is coasting down a steep hill," says Jim Minervino, research analyst for the Printer Market Program at International Data Corp. (IDC), a Framingham, Mass.-based market research firm.

Optimized software can absorb some of the processing time of rasterizing a page image. Page description languages compress data transmission by prescribing formulas for each letter sent from the host instead of sending a data stream of simple bits that the printer must compose

into fonts (see story page 49). Similarly, a few languages for graphics composition are available for the more graphics-capable printers.

A central application for the graphics capability of page printers is electronic forms. Most users who require high-volume, letter-quality printing produce some type of forms. With impact technology, preprinted forms fit the need, but page printers can create their own forms (see story page 54). Using the proper software, operators can create and update forms electronically and merge them at print time with variable data. For some users, the saving from eliminating an inventory of preprinted forms alone can cost-justify the investment in a page printer.

Users prize page printers for their relatively quiet operation. There is

nothing silent about page printers, as advertising literature would have buyers believe, but nonimpact devices are certainly quieter than their impact counterparts. A high-end laser model spells relief after the hammering of several 300 line/min line printers. Quiet operation frees page printers to be moved out into the office.

Both low-end and medium-range page printers offer at least some degree of user maintenance. Vendors package the printers' consumables — elements that either run out or wear out — in self-contained cartridges that end users can replace.

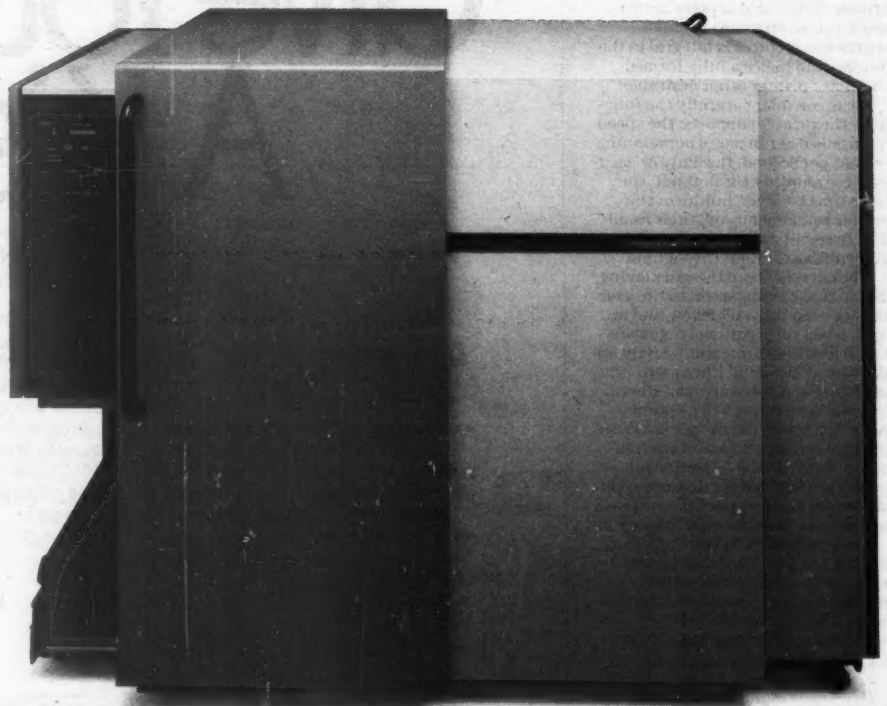
User-serviceable, high-volume printers offer further flexibility advantages in that departments can control their own preventative maintenance schedules according to us-

age. DP need not schedule the departments centrally, and end users can prepare for end-of-the-month rushes or other specific needs.

Vendors strive to make the low-end page printers particularly impervious to office environments. Like copiers, they must withstand dust and heat outside the computer room as well as operators who may not be familiar with controls and switches. By and large, users report no unexpected problems with the reliability of the machines.

"Reliability is outstanding among the users we talked to," reports Minervino, "at least in relation to what users expected. In fact, we didn't find any real problems — just limitations."

Now a laser printer with a price that's fit to print.



Product Spotlight/Page Printers

As Minervino and other analysts point out, one way to ensure that a page printer will break down before its time is to exceed the vendor's recommended printing volume. Rated in pages per month — or in the case of high-speed devices that use fanfold paper, in feet per month — these duty-cycle ratings must be taken seriously by users to avoid downtime or reduced device life.

Duty cycle in some cases forms the basis for classifying a printer as a single-user, workstation device or as a shared printer for use with a local-area network. According to Pesko Associates, an 8 page/min, 3,000 print/mo printer is not a local-area network device. Says Pesko Associates Vice-President Steven Pytko, "It's a question of device life. If the vendor says the printer will

last for 100,000 copies and you run it at 20,000 prints a month, you figure it out — your printer won't last more than five months."

Some users press light-duty printers into service as shared devices to recoup the \$4,000 costs, but even the low-end vendors recommend using a heavier duty model instead.

Several printer vendors such as Konishiroku Photo Industries Co. (Konica) and Ricoh Corp. capitalized on the low volumes of industry leaders Canon U.S.A., Inc. and Hewlett-Packard by offering models in the same price range that print at similar speeds but that boast volumes of 6,000 to 10,000 page/mo.

Paper-handling functions can

keep a light-duty printer from being fully useful for printer sharing as well. Canon-based printers provide only 100-sheet input trays for paper, which at the rated 8 page/min will need to be refilled every 12 minutes. Optimally, low-end printer vendors should provide 250- to 500-sheet capacities for input, a like amount for output and options for more than one input cassette, so users can choose between different paper stocks.

At the high end, users should look for job stacking mechanisms to separate successive jobs plus variable paper sizes, envelopes and transparencies. All the options should be available via software commands and require no operator intervention. For devices whose mission is speedy production, paper handling and capacity should be one of the

buyer's first considerations.

But perhaps the single most important buying consideration rests with software. For high-speed and desktop systems alike, a library of software alone can provide the features and full range of functionality contained in the printer box.

Software requirements may include printer drivers to interface the applications with the printer, print services such as spooling and queuing, forms generation and graphics composition packages, font creation and editing software, page composition programs for cut and paste, paper handling commands for multiple paper input and output trays or communications programs for network transmission and multiple host access.

Even in an office of personal computers, one end user may need the printer for simple text output using Diablo Systems, Inc. Diablo 630 emulation, while a coworker will need to print an elaborate schematic demanding bit-mapped page composition. Even if the printer is equipped for both, software should handle the switch from one mode to the next without operator intervention.

Software availability, especially for the low-end page printers, continues to lag behind hardware availability. New versions of popular applications programs include certain page printers on their print menus, but most users struggle along with older versions of the software that were already installed when the page printer came on board. IDC's Minervino says that despite some vendors' recent efforts, the Lotus Development Corp. 1-2-3 user "still has to use a nightmarish combination of escape codes" to run a low-end page printer.

Users can obtain software for all these page printer functions in one of three places: the page printer vendor, the applications software vendor or one of the growing number of independent software vendors selling page printer software. Failing that, many page printer vendors and software vendors make information available for user companies to write their own interfaces and drivers.

With the full range of features, print volumes and flexibility options available from more than 80 vendors, prospective page printer customers must evaluate their needs before becoming enthralled with the technology. It is a feature-driven market, where sometimes the availability of a heretofore-unheard-of feature will instantly make it seem like a requirement.

IDC's Minervino says, "Go in with your exact application in mind and find out what support is available from the vendor. For instance, IBM is strong in banking, and Xerox knows insurance. But don't just call IBM and Xerox. Call Siemens, Honeywell, Delphax — many others."

Richard Young, project manager for graphics and text architecture planning at Boeing Computer Services Co. in Seattle, helps test printer configurations for many of Boeing Computer's divisions. He advises a systems approach.

"Know what application sets you intend to perform: what the functional requirements are, what the relative complexity of pages will be

Continued on next page

The DatagraphiX 6800. Best price/performance \$179,000 can buy.

The 6800 is only about half the price of other high-production laser printers.

Yet, the 6800 is a full-function laser printer that fits in the space of one high-performance line printer.

Five times faster than line printers.

At 103 pages per minute, the 6800 outperforms five 2,000-line-per-minute line printers.

That's because it prints a page at a time instead of a line at a time.

And it prints each page letter-perfect, with 240 x 240 dot letter-quality resolution.

More versatile than other laser printers.

The 6800 is no ordinary laser printer. Laser generated data and text can be merged with optically projected forms of virtually any configuration within a wide range of page sizes. And, a new electronic forms option allows you to pre-program and dynamically merge electronic forms with print data, eliminating the need for many costly pre-printed forms. Its unique cold fusing process gives you the flexibility to print on a wide range of stocks and forms... window envelopes, even heat-sensitive, adhesive-coated forms... stocks you wouldn't think of loading into an ordinary laser printer.

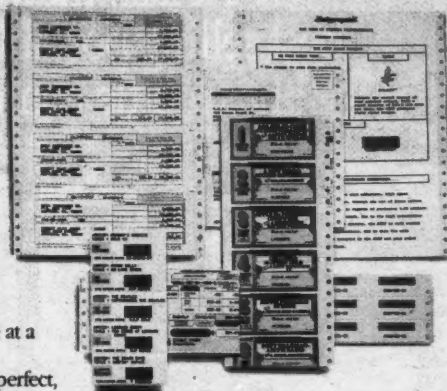
Strong, silent.

The 6800 is built rugged but, unlike an impact printer, it's very quiet and very neat.

What's more, it's backed by the leader in computer output management systems, DatagraphiX, with strong service and support worldwide.

So call or write us today for actual print samples, brochure and complete specifications. DatagraphiX, Department 5C-3515, P.O. Box 82449, San Diego, CA 92138.

Phone toll-free (800) 457-7171. In California, call (619) 291-9960, Ext. 5626. TWX: 910-335-2058.



DatagraphiX
The Computer Output Management Company™
a General Dynamics subsidiary

See us at AIIM, Booth 1129

See us at ABA/NOAC, Booths 1018-1024

Product Spotlight/Page Printers

Continued from previous page

and so on. Without that," he says, "you're really shooting in the dark."

From there, he advises, determine what interface standards will support these requirements. "Don't be myopic in setting these standards," Young says. "Ask, 'Is it extensible? Is it flexible?'" If several users will share the page printer, define the print services the department will need: print spooling, job queuing, contention management, automatic reset and so on. In a multivendor environment, identify the communications standards that are present in installed equipment so the printer drivers can be specified accurately.

Buyers should consider cost of ownership above cost of acquisition. Cost of ownership, according to Pesko Associates, consists of acquisition costs (including interfaces, paper trays and additional fonts), service and maintenance charges, usage charges if applicable and consumables. Other expenses to include are floor space, electric power and operator time.

Pesko Associates breaks page printers into four groups by operating environment: centralized, satellite, office cluster and workstation.

Centralized environment. At the high end are the printers used in centralized DP environments. These 80+ page/min machines are installed primarily for their raw speed or for applications that require high quality in combination with high volume. Credit card billing is one example, printing government tax forms is another.

Companies with these two specific applications may run 10 or 20 high-end laser printers, each producing more than 100 page/min. Much simpler applications may justify a single such machine within a company. Centralized printers typically print up to 1 million page/mo and operate in a dedicated printer room.

According to IDC, 90% of the page printers that run at 75+ page/min were sold by IBM and Xerox Corp. last year. IBM's Model 3800 and Xerox's 9700 each captured roughly 45% of this fairly stable market. The technology at this level is already quite mature.

For printers that plow through paper as fast as half a second per page, the paper-handling facilities become a major technical issue and end up requiring a substantial amount of the controller's power and functionality.

Xerox page printers emphasize cut-sheet paper handling. Using standard 8½-by-11-in. sheets, Xerox's 9700 boasts dual input and output stackers for continuous operation, even during reloading. Cut sheets afford end users more immediately usable output for some applications without the trouble of bursting and decollating.

On the other hand, IBM's more traditional use of fanfold saves many paper jams. For years, this distinction served as the deciding factor for many customers. Since some applications were served by each, both features remained marketable. Recently, IBM began offering a cut-sheet option, tacitly acknowledging an ongoing need for cut-sheet handling of high-quality printed material.

Another technological difference in some of the centralized printers is their use of a cold fusion technique rather than a heat-fusing station, in which the dry toner is fused to the page. Cold fusion allows the machines to operate at lower temperatures for higher reliability and fewer cooling requirements.

Other than that, high-end models' specifications look a lot like those of the low-end models that emulate them: Resolutions run typically at either 240 by 240 or 300 by 300 dot/in. for text, with a variety of graphics resolutions. Users can mix text and graphics on a page via the appropriate software and can store and download electronic forms for overlay with variable data.

Some of the very high-speed page printers store fonts and data on Win-

chester disks with 5M- to 25M-byte capacities. Many accept electronic forms and font libraries via diskette or magnetic tapes.

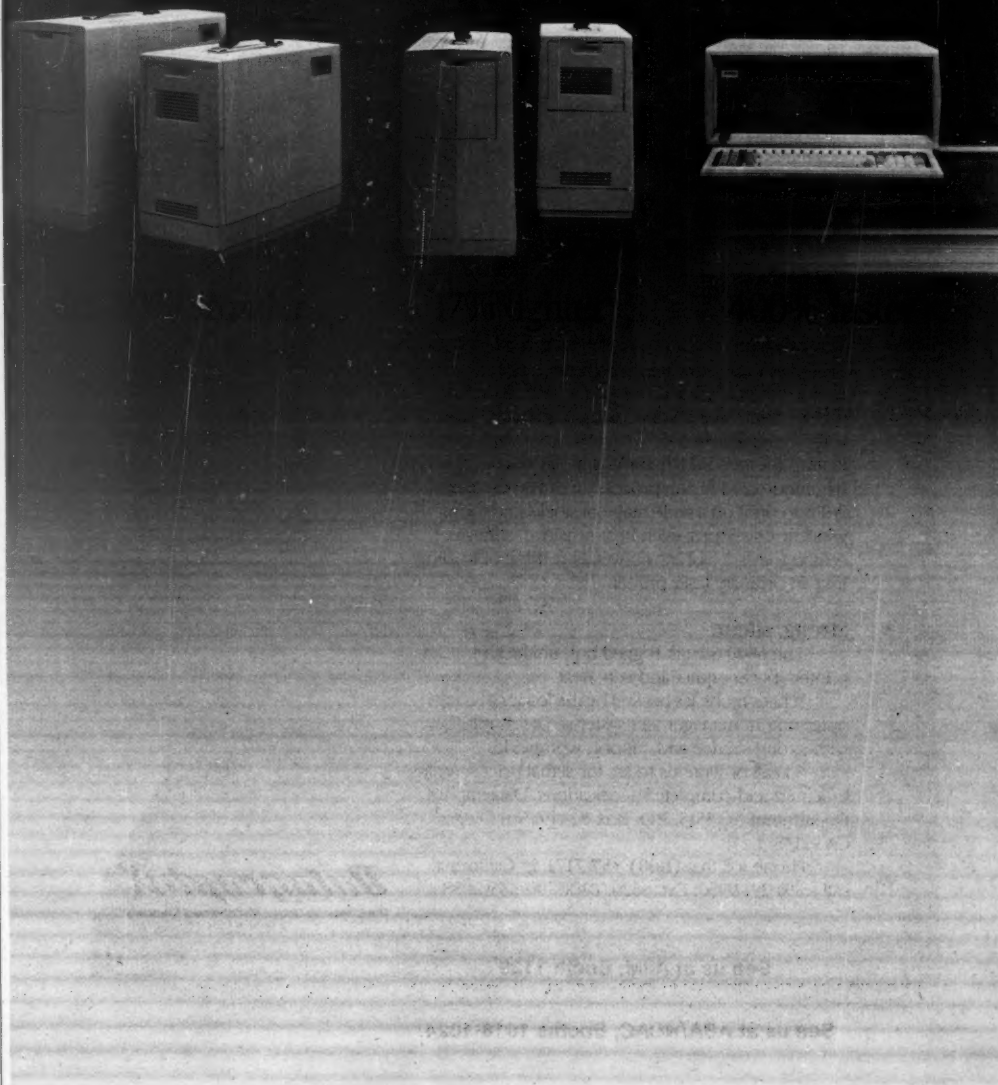
Interestingly enough, at the high end, not all page printers are particularly intelligent. Some older models such as the IBM 3800 and Xerox 9700 lack the raster image processor that would allow them to accept unformatted data streams from the host. According to Boeing Computer Services' Young, these machines accept data on a device level rather than as intelligent nodes. This configuration places the burden of processing back on the host, tying up additional CPU time. Yet the simpler configuration is less expensive, involves fewer components and may

set more flexible limits on page formatting capabilities.

Maintaining a high-speed page printer in many ways resembles owning a mainframe or large minicomputer. Requiring a computer room environment and regularly scheduled preventive maintenance, these high-speed devices must be adjusted and supported to keep printing resolution tuned and downtime at a minimum.

Satellite environment. A slight change at the high end came in price shaving over the past year, as the centralized page printers felt the impact of a new generation of 35 to 80 page/min machines. Classified as satellite printers, these models offer all the functionality of the high-end, centralized machines but at somewhat lower speeds. Satellite page

At last, the world's
best-selling portable computer
has a little competition.



Product Spotlight/Page Printers

printers are high-volume, production-oriented output devices as well but reside outside the company's data center. Often satellite devices serve as the main production printer at a branch location or within a division of the company. Output is more conveniently located to end users, and the printer may be under the control of departmental staff.

At this level, page printers compete heavily — and successfully — with 300, 600 and 900 line/min line printers. Page printers' quiet operation and high-quality output make them favorites in some DP shops, especially as prices come down. But these models have a long row to hoe; after all, they are up against workhorse line printers that users trust and that are in most cases already paid for.

Xerox is a strong contender in this middle range, with laser models at the 50, 60 and 70 page/min marks. Several vendors, including Xerox, offer page printers in this category based on imaging technology other than lasers; these are the devices that may ultimately give the high-end models a run for their money for sheer price/performance reasons.

Xerox, C. Itoh Electronics, Inc. and Delphax Systems, Inc. each offer printers based on ion deposition technology. Although ion deposition printers generate 240 by 240 dot/in. — the standard density for page printers — many users indicate print quality is slightly lower than the laser equivalent.

Another quality weakness stems from the extreme pressure used in bonding toner to paper with the cold

fusion process of ion deposition printing. This process tends to flatten the finish of the paper, making ordinary bond slightly shiny. Whether these minor differences matter to end users greatly depends on the individual application.

Magnetic printing technology offers yet another option. Bull Peripherals of France, marketing 50 page/min and 90 page/min models in the U.S., is the current champion of this technique.

These printers offer some of the same advantages over laser printers that ion deposition printers offer: lower power consumption, simpler construction and potentially higher reliability. The magnetic drum is extremely hard — Bull rates its drum

life at 10 million pages. But again, some users do not feel the print output quality matches that of lasers.

Yet magnetic printers can perform one printing task no other nonimpact technology can: The magnetic drum retains a perfect, latent page image and can reproduce it multiple times on demand without re-creation of the image.

Since throughput depends heavily on data transmission and image processing in most cases, the copying capability yields exciting improvements in throughput speed for any application that produces multiple copies. In all, magnetic technology holds great promise, though vendors may not have all the wrinkles ironed out.

These new satellite models represent price/performance breakthroughs while maintaining consistently high volumes, all of which spells good news for many high-volume users.

Office cluster environment. The third operating environment where page printers are used is the office cluster. Here, end users share the device in a distributed processing environment, departmental computer system or local-area network configuration.

Sometimes two to eight users will link up to the printer via a simple sharing device such as a smart switch or manual A-B switch.

Page printers in this category produce anywhere from 10 to 35 page/min, with prices falling into the \$5,000 to \$50,000 range. Office cluster printers exhibit the greatest variety of capabilities and applications of any group.

The 35 page/min laser and ion deposition devices function as production printers on a smaller scale, with an emphasis on paper-handling and collating options. Many 24 page/min printers offer sophisticated bit-mapped graphics or typesetting functions.

Ten and 12 page/min models within the office cluster category offer the high duty cycles that lift them above the single-user, workstation printer classification. Their potentially low price allows vendors to combine features several different ways from a stripped-down, text-only model printing 8 page/min at \$3,495 to a bit-mapped graphics version printing 12 page/min at \$15,800, both based on the Ricoh 4080 laser print engine.

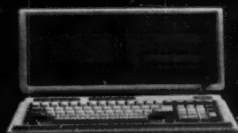
Besides the specialized models, the office cluster category is crowded with offerings from traditional word processing and office automation vendors: Wang Laboratories, Inc., Prime Computer, Inc., Digital Equipment Corp., Data General Corp., NBI, Inc. and Hewlett-Packard all provide page printers to attach to their office systems with the benefit of ready-made compatibility.

Workstation environment. Workstation printers comprise the low-end operating environment group. Here, page printers work one-on-one with end users, so low price is at a premium. Yet the devices are potentially as capable as their office cluster and even satellite counterparts.

The Hewlett-Packard Laserjet is the runaway favorite workstation printer. Based on the ubiquitous Canon LBP-CX print engine, the Laserjet revolutionized low-end laser printing nearly two years ago with

Continued on page 55

Introducing the remarkable new COMPAQ PORTABLE II



Now there's a portable personal computer so small, so light, and so fast it defines a new industry standard. From the same company that set the standard — COMPAQ.

The new advanced-technology COMPAQ PORTABLE II™ has all the advantages of the world's best-selling full-function portable — the original COMPAQ Portable — plus it's even more portable. And it's far more powerful than most desktop computers.

With its 80286 microprocessor, the COMPAQ PORTABLE II can run all the popular business software written for IBM® Personal Computers. At speeds three to five times faster than the COMPAQ Portable, IBM PC/XT™, and other compatibles.

It's more computer in less space

Never before has a computer this small been capable of so much. Making the COMPAQ

PORTABLE II 30% smaller and 17% lighter — with no reduction in monitor size and a big gain in functionality — was an engineering triumph. The result is a full-function, advanced-technology personal computer that's easy to take on business trips or carry from desk to desk.

A computer for now and for the future

The COMPAQ PORTABLE II excels in compatibility. And because of its standard 360-Kbyte diskette drive format, your data diskettes will be fully interchangeable with other COMPAQ, IBM, and compatible personal computers.

Expandability? An optional 10-Megabyte fixed disk drive stores over 5000 pages of data. RAM expands to 2.1 Megabytes without an expansion slot, and with one expansion slot RAM can expand to 4.1 Megabytes. Since interfaces for the most popular peripherals are already

built in, the two square slots can be used for connecting your computer to others: add a modem, a networking board, or a board for communicating with your mainframe.

No compromise

The COMPAQ PORTABLE II puts tremendous computing potential within the grasp of every computer user. It's backed by the service and the support of over 2900 Authorized COMPAQ Computer Dealers worldwide. Plus, it's made by the undisputed world leader in portable personal computers. And for that title, there's no competition.

For the name of the dealer nearest you, call toll-free 1-800-231-0900 and ask for Operator 16. In Canada, call (416) 449-8741. In Europe, telex 84117898630AB; 898630 COMPAQ TTX D.

IBM® is a registered trademark and IBM PC/XT™ is a trademark of International Business Machines Corporation. ©1986 COMPAQ Computer Corporation. All rights reserved.

COMPAQ
PORTABLE II™

It simply works better.

Electronic forms: An alternative to mechanical/optical overlays?

By G. H. SUITER JR.

The ability to create, store and print forms on-line electronically represents the deciding factor for many users switching from line printers to page printers. A variety of high-volume data processing applica-

tions require forms, including producing utility bills, invoice data, general account information, bank statements and check generation.

Interest in using electronic forms has grown steadily since the first products were introduced in the late 1970s. Data center managers cur-

rently using mechanical/optical forms overlays or no forms overlays at all now seriously consider electronic forms implementation.

Electronic forms allow fixed images to be merged with variable print information on demand without operator assistance. Subsequently, electronic forms

serve as an alternative to mechanical/optical forms overlays, which also allow fixed images to be merged with variable print information but require operator intervention to be certain the right form overlay matches the right job.

In shops with 100 or more jobs — each requiring a dif-

ferent form overlay — a significant inventory management problem presents itself. Using electronic forms can greatly reduce or eliminate this problem.

Electronic forms typically load much faster and hence improve the productivity of the printing device. However, the mechanical/optical overlay produces a higher quality image because the photographic process used to create it is not limited by dot addressability.

Electronic forms, on the other hand, are limited in their resolution — usually 240 by 240 or 300 by 300 dot/in. — to the underlying addressability of the laser or ion imaging device.

As a result, some complex logos and very fine lines appear clearer to the critical eye when generated from a mechanical/optical overlay. In many cases, however, this distinction may be too fine for the average end user to concern himself with, and the ease-of-use advantages far outweigh the fine difference in detail.

Creating complex forms costs less for photographic overlays because of extended programmer time at the workstation to create the electronic form. But straightforward electronic forms — boxes and simple graphics — may cost less to create than photographic overlays and be indistinguishable from a quality standpoint.

When updating forms, users find electronic form changes much easier to implement, especially if multiple geographic locations are involved. Electronic forms can be updated centrally and transmitted to remote sites, ensuring that each site receives exactly the same — and the latest — forms.

Electronic forms also substitute for preprinted forms that many companies use for invoicing and other mailings.

The big cost saving with electronic forms comes from not having to inventory preprinted forms. Users need not worry about stock depletions, obsolete inventory or inventory carrying costs if they use electronic forms in lieu of preprinted forms.

As the ease of using and implementing electronic forms improves and the cost decreases, more internal and external data processing reports will be highlighted using forms overlays — especially electronic forms. ■

Suiter is director of planning at San Diego-based Datagraphix, Inc., a vendor of page printers and software.

More And More Printers Are Seeing The Light.

Every day, more and more IBM 3270 users are saving money and increasing productivity by attaching ASCII printers instead of IBM 3287s to their networks.

And one company is providing these users with more protocol converters than all others combined.

Avatar.

The reason is simple. The Avatar PA1500 goes well beyond simple 3287 emulation. It opens the entire spectrum of ASCII printers to the 3270 user, because it can be used with laser printers, ink jet printers, line printers, other dot matrix printers and plotters — virtually any ASCII printing device.

The PA1500 is also easy to install, requiring nothing more than a simple coax connection to IBM 3274/3276 controllers. And, because it provides all the important front panel controls of the 3287, it's easier to use than other converters.

If there are 3270 systems in your company still operating in the dark, help them see the light. Call us now at (617) 435-6872.

Avatar manufactures a complete line of protocol converters for terminals, personal computers and printers, micro-to-mainframe links, network gateways and other data communications products.



Avatar

Where Value Is Communicated

Avatar Technologies Inc.

99 South Street, Hopkinton, MA 01748

(617) 435-6872

TELEX: (710) 390-0375

Avatar and PA1500 are trademarks of Avatar Technologies Inc. IBM is a registered trademark of International Business Machines Corporation.

Avatar emulates printers made by Anadex, Canon, Centronics, Dataproducts, Datasearch, Diablo/Quint, Digital Equipment Corporation, Epson, Florida Data, Fujitsu, Gemini, Genicom, Hewlett Packard, NEC, Okidata, Printronix, Titan International, and others.

Product Spotlight/Page Printers

Continued from page 53

its low price and desktop size. Many, many vendors followed HP's lead.

At this level, the print engines are commodities: The Canon LBP-CX and the Hitachi Ltd., Ricoh and Kentek Information Systems, Inc. engines all turn up inside many resellers' boxes. Vendors choose a print engine and vary the optional features, software and control electronics to create a full product line.

Vendors can keep end-user prices down in different ways. One route cuts down on intelligence for page formatting, sticking to either text-only Diablo 630 emulation or a limited-graphics mode emulating the Epson America, Inc. FX-80 or the IBM Graphics Printer. Many printers, including the original low-end best-seller, the Laserjet, offer the limited functionality.

Configured this way, page printers retain the speed, quiet operation and print quality of laser technology while greatly reducing memory and imaging software requirements — and flexibility. But users do experience fewer difficulties in finding ready-made printer drivers for these emulating page printers.

Another route to cost-justifiable single-user page printers cuts down on control electronics by limiting print speed to 4 or 6 page/min. A single user may never need speeds higher than 4 page/min, and vendors can cut costs significantly with easier paper-handling tasks and slower image-processing requirements.

Right now, the only page printer shipping to end users priced at less than \$2,000 is the 6 page/min Kiss from QMS. Based on the 8 page/min Canon LBP-CX engine, the QMS Kiss shocked the printer community last November. Analysts had long held out \$2,000 as an important price threshold, below which page printers would become much more of a mass-market product.

Other applications call for greater functionality even for a single user. Models are available for single-user bit-mapped graphics, including electronic forms and semi-professional desktop publishing capabilities. The Apple Laserwriter can be considered in this context, although some companies use it in office clusters with a small local-area or printer-sharing network.

Most printers in both the workstation and office cluster categories rely on laser technology, but a few models appeared in 1985 using an LED array as the light source for the electrophotographic process. LED arrays do not require the complex focusing lenses of laser imaging and were originally promoted as a cost-saving technology. In fact, the simpler technology costs the same but proves to be sturdier.

Page printers face off against ink-jet and thermal printers in the non-impact world. Both of these technologies offer quiet, nonimpact operation, and though neither can match the page printers for speed, each holds a certain fascination.

Thermal printing, and lately thermal transfer, has gotten away from the peculiar paper that was once required on all models. IBM's Quietwriter, for example, prints on plain paper for correspondence. It falls short of letter quality, but at \$1,395 it also falls short of laser

printing prices. And thermal printer technology has been successfully miniaturized for the ultimate in flexible applications: battery-powered portables.

Ink-jet printing technology has itself overcome hurdles, particularly in unclogging and controlling ink flow. Now Diconix, Inc.'s Diji 1 pushes price/performance further toward competing with page printers, printing 300 dot/in. text at 20 page/min and selling for just \$12,000.

Ink-jet printing's real charm lies in its color capability. But although ink-jet printers still produce the only elaborate color printing in the market, the jury is still out on how much demand there is in a business envi-

ronment for color printing.

The future of page printing will bring ever-more-sophisticated paper-handling functions, including facilities for envelopes, transparencies, variable paper sizes or weights and finishing systems. With the advent of dedicated graphics processors in the controllers, graphics production will become feasible on an in-house, office cluster level as never before. Printer controllers will offload imaging and storage more and more from hosts, speeding system throughput.

"Improved software is important for making gains in flexibility," says Boeing Computer's Young. "But it is the raster image processors that are key for page printers. In the future, I expect to see parallel, pipelined processing and dual-ported memory in these printers.

Also, it would be a perfect application for reduced instruction set computer processors, since you can predict exactly what instructions will be used."

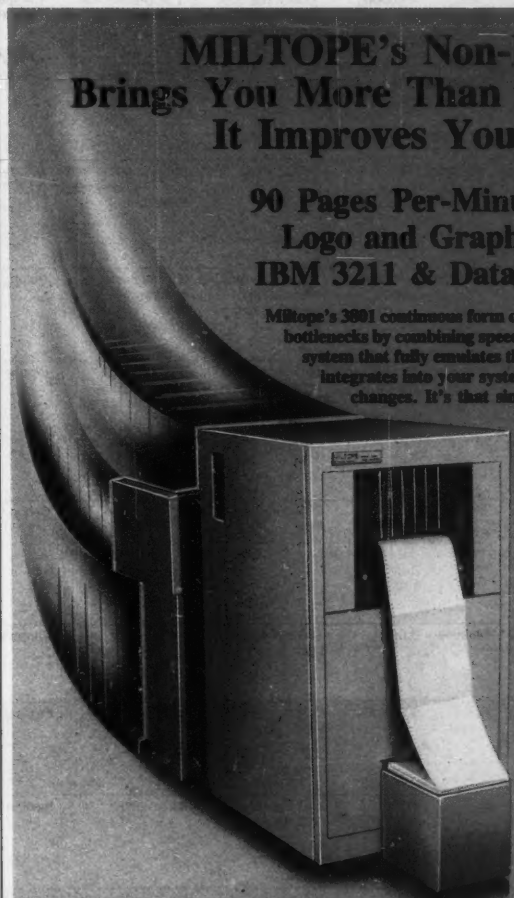
Young says these architectures would be appropriate for any speed print engine, foreshadowing a day when an end user's Intel Corp. 80186-based personal computer will be accompanied by a far more powerful, pipelined printer.

Increasingly sophisticated page printers will never eliminate the demand for line printers. Industry watchers observe that major vendors have not slowed their introductions of new impact models recently. But on the other hand, neither will increasingly sophisticated office automation ever eliminate the need for paper — crisply, quietly printed. ■

MILTOPE's Non-Impact Printer Brings You More Than Top Performance ... It Improves Your "IMAGE"

90 Pages Per-Minute ... High Resolution ...
Logo and Graphic Forms Generation ...
IBM 3211 & Data Products I/O Compatible

Miltope's 3801 continuous form or cut sheet page printer eliminates time-consuming bottlenecks by combining speed, reliability and versatility in an electronic printing system that fully emulates the IBM 3211. The plug-to-plug compatible printer integrates into your system with little or no conversion and no application changes. It's that simple ... no productivity is lost!



SUPERIOR IMAGE QUALITY—Using a 240 × 240 dot per inch matrix, Miltope's 3801 ion deposition printer provides letter-quality alpha/numeric printout plus high-resolution graphics for signatures, logos and form generation.

HIGH-PRODUCTIVITY—At 90 pages per minute, the 3801 prints in excess of 10,000 lines per minute in a 2-up format. Whether your computer is a big IBM mainframe or a super-mini from DEC, Prime, HP, Nixdorf, or whatever, the capability to output more than one-million pages per month dramatically improves job turnaround time and quickly eliminates major printing backlogs.

VERSATILITY—The variety of characters available with electronic printing far surpasses any impact printer. Two fixed and two variable 128 character sets are continuously "on-line," host or operator selectable in either portrait or landscape format. The 3801 prints sharply on continuous form or plain bond paper, colored stock, preprinted forms, gummed labels and other surfaces where laser printers often fail.

EASE OF INTEGRATION—The simplicity of ion deposition technology minimizes maintenance and maximizes uptime. Both models, cut sheet or continuous form, are compact. Heat dissipation (5400 Btu/hr) and power consumption (2470 watts) are extremely low when compared with hi-speed impact or laser printers.

HASP COMPATIBILITY—For remote site printer applications, the 3801 can be modem connected to the data line of the central computer and programmed as a HASP workstation.

Electronic printing is "clean" and "efficient." Programmable font selection eliminates the repetitive changes of the print-chain module ... toner imaging eliminates messy ribbon replacement ... straight line paper path virtually eliminates paper jams and misfeeds.

COST EFFECTIVE—The price is right! Purchase or lease with a full maintenance program.

For additional details, or to arrange for a demonstration, write or call today.

MILTOPE

BUSINESS PRODUCTS, INC.

1770 WALT WHITMAN ROAD • MELVILLE, NY 11747 • (516) 420-0200

See us at the Atlanta COMDEX Show Booth 4058
Investigate our VAR/Distributor Program

Product Spotlight/Page Printers

PAGE PRINTERS

Vendor/Product	Print Speed (pages/min)	Printing Technology	Resolution (dots/in.)	Number of Fonts per Page	Duty Cycle (pages/mo)	Paper Handling Features Included in Price	Paper Handling Options	Print Engine	Printer Applications	Price
Advanced Technologies International, Inc. 2041 Mission College Blvd. Santa Clara, Calif. 95054 Laserprinter 870	8	Laser	300 by 300	16	3,000	150-sheet input	Triple-bin sheet/ envelope feeder	Canon LBP-CX	For use with IBM Displaywriter for multiple fonts, forms creation and signatures; emulates IBM 5218	\$4,495
Advanced Technologies International Laserprinter 880	8	Laser	300 by 300	Multiple	5,000 to 10,000	Not available	Not available	Ricoh 4080	Heavy-duty printer emulates Diablo 630, Epson FX-80, Hewlett-Packard Laserjet	\$4,495
Advanced Technologies International Laserprint 2670	26	Laser	300 by 300	16	50,000	Dual-input cut- sheet feeder for 750 sheets	1,500-sheet bin, collator	Dataproducts LZR-2600	Supports IBM, DEC, Wang systems; emulates Epson FX- 80, NEC Spinwriter, Xerox 2700, Calcomp, Diablo 630; supports Interleaf languages and Adobe Postscript	\$11,400
American Computer Hardware Corp. 2205 S. Wright St. Santa Ana, Calif. 92705 CIE 3000	30	Ion deposition	300 by 300	Variable	150,000	1,000-sheet input	Job jog, sorter and 2,000-page in-feed elevator	Delphax/C.Itoh 53000 engine	General-purpose data processing printer	\$12,995
American Computer Hardware Fast 5000 Model 5100	60	Ion deposition	240 by 240	Variable	1 million to 2 million	Cut-sheet machine with option of several paper paths	Nonultraviolet coating/drying device, positive stacking	Delphax 2460	Suited for labels application, graphics, high- volume billing applications	Not available
American Computer Hardware Fast 5000 Model 5600	90	Ion deposition	240 by 240	Variable	1 million to 2 million	Pin feed continuous with refold device for output	Nonultraviolet coating/drying device, roll-to-roll paper	Delphax 2460	Can be custom designed, applicable for data processing applications as well as specialty situations such as attaching to a web press	Not available
Apple Computer, Inc. 20525 Mariani Ave. Cupertino, Calif. 95014 Laserwriter	8	Laser	300 by 300	Multiple	3,000	100-cut-sheet input	Not available	Canon LBP-CX	For word processing and desktop publishing, uses Adobe Postscript, IBM Personal Computer compatible	\$5,999
Apple Computer Laserwriter Plus	8	Laser	300 by 300	Multiple	3,000	100-cut-sheet input	Not available	Canon LBP-CX	For desktop publishing with Apple Macintosh; 11 font families	\$6,798
Bull Peripherals Corp. 766 San Aleso Ave. Sunnyvale, Calif. 94086 MP 6090	90	Magnetic	240 by 240	8	500,000	Continuous forms input	Not available	Proprietary	High-volume data processing	\$79,500
Burroughs Corp. One Burroughs Place Detroit, Mich. 48232 AP 9208	8	Laser	300 by 300	8	6,000	250-sheet cassette	Not available	Ricoh 4080	General-purpose printer for office applications, emulates Diablo 630	\$3,395
Canon U.S.A., Inc. One Canon Plaza Lake Success, N.Y. 11042 Canon LBP-S A1	8	Laser	300 by 300	16	3,000	100-sheet paper cassette, manual feed	High-capacity outlet port	Canon LBP-CX	General-purpose printer for word processing, data processing, spreadsheet, business graphics	\$3,000
Canon U.S.A. Canon LBP-S A2	8	Laser	300 by 300	16	3,000	100-sheet paper cassette, manual feed	High-capacity outlet port	Canon LBP-CX	Desktop publishing, full graphics (raster, vector)	\$4,300
CIE Terminals, Inc. 2505 McCabe Way Irvine, Calif. 92714 Lips 10	10	Laser	300 by 300	16	15,000	Dual-input tray, 250 sheets	Alternate size tray	Proprietary	Compatible with Epson FX-80 and Diablo 630	\$3,495
C. Itoh Electronics, Inc./ Delphax Systems, Inc. 2515 McCabe Way Irvine, Calif. 92713 CIE 3000	30 or 45	Ion deposition	300 by 300	1	150,000	2,500-sheet feeder	2,000-sheet elevator	Proprietary	Data processing, mass mailing, financial statements	\$12,995 or \$15,450

The companies included in this chart responded to a recent written survey conducted by Computerworld. Vendor list was furnished by GMI Information Services, an on-line data base supplier based in Lexington, Mass.

Source: CW Chart compiled by Amy Summerfield and Christie Stearns

Product Spotlight/Page Printers

Vendor/Product	Print Speed (page/min)	Printing Technology	Resolution (dpi/in.)	Number of Fonts per Page	Duty Cycle (page/mo)	Paper Handling Features Included	Paper Handling Options	Print Engine	Printer Applications	Price
Computer Language Research, Inc. 2395 Midway Road Carrollton, Texas 75006 Formwriter 2A	6	Laser	300 by 300	36	3,000	100 cut sheets	Forms management, document collation	Canon LBP-CX	Electronic forms automation system, word processing, data processing	\$4,995
Computer Language Research Formwriter 4	8	Laser	300 by 300	36	5,000	250 cut sheets	Forms management, document collation	Ricoh 4080	Electronic forms automation system, word processing, data processing	\$5,995
Computer Language Research Formwriter 6	10	Laser	300 by 300	36	5,000	250 cut sheets	Forms management, document collation	Xerox LP-10	Electronic forms automation system, word processing, data processing	\$6,995
Computer Language Research Formwriter 10	20	Laser	300 by 300	36	50,000	2,000-sheet paper deck, two 250-sheet cassettes, duplex	Document collation, two 250-page input trays	Canon LBP-20	Electronic forms automation system, word processing, data processing	\$14,995
Computer Language Research Formwriter 10D	20	Laser	300 by 300	36	50,000	2,000-sheet paper deck, two 250-sheet cassettes, duplex	Two 250-page input trays, 2,000-page input tray	Canon LBP-20	Electronic forms automation system, word processing, data processing	\$19,995
Concept Technologies, Inc. P.O. Box 5277 Portland, Ore. 97208 Conceptwriter	8	Laser	300 by 300	Multiple	3,000 to 5,000	100-sheet input	Not available	Canon LBP-CX	Full bit-mapped graphics, supports the Concept 100 Personal Publishing system	\$4,495
Corona Data Systems, Inc. 275 E. Hillcrest Drive Thousand Oaks, Calif. 91360 LP-300	8	Laser	300 by 300	32	3,000	100-sheet input	Not available	Canon LBP-CX	Desktop publishing, high-speed graphics, partial page graphics at full resolution	\$2,995
Corona Data Systems LP-300X	8	Laser	300 by 300	Unlimited	3,000	100-sheet input	Not available	Canon LBP-CX	General-purpose printer, desktop publishing, full page graphics, network print server	Not available
Corporate Data Sciences, Inc. 2560 Mission College Blvd. Santa Clara, Calif. 95050 CDS2300	8	Laser	300 by 300	32	5,000 to 8,000	100-sheet bin	Not available	Canon LBP-CX	Suited for Diablo 630 replacement, image processing and mainframe or technical users	\$5,995
Data General Corp. 4400 Computer Drive Westboro, Mass. 01580 Model 4557	8	Laser	300 by 300	8	3,000	100-sheet tray	Four trays	Canon LBP-CX	General-purpose printer, duplex printing	\$3,560
Data General Model 4558	8	Laser	300 by 300	8	3,000	100-sheet tray	Four trays	Canon LBP-CX	Duplex printing, business graphics	\$6,055
Datagraphix, Inc. P.O. Box 82449 MZ 5C-3515 San Diego, Calif. 92138 4800 Online	60	Ion deposition	240 by 240	4	100,000 to 700,000	1,500-sheet input/output powered stacker capacity	Not available	Delphax 2460	General-purpose printer with electronic forms	\$67,900
Datagraphix 6845 Online	103	Laser	240 by 240	4	1.9 million feet	Power forms stacker	Burster, trimmer, stacker, roll-paper handling equipment	Siemens ND3-HR	General-purpose, cold fusing, windowed quick-fold envelopes, identification cards, bar codes, sysouts	\$179,000
Datagraphix 9830 Offline	206	Laser	144 by 180	4	3.4 million feet	Power forms stacker, rollout forms input tray	Burster, trimmer, stacker, roll-paper handling equipment	Siemens ND2	Hot fusing, off-line flexibility, labels, identification cards, bar codes	\$309,000
Datagraphix 9835 Online	206	Laser	144 by 180	4	3.4 million feet	Power forms stacker, rollout forms input tray	Burster, trimmer, stacker, roll-paper handling equipment	Siemens ND2	Labels, identification cards, bar codes, sysouts	\$255,000
Datagraphix 9845 Online	206	Laser	240 by 240	4	3.4 million feet	Power forms stacker, rollout forms input tray	Burster, trimmer, stacker, roll-paper handling equipment	Siemens ND2-HR	Hot fusing, identification cards, bar codes, sysouts	\$279,000
Dataproducts Corp. 6200 Canoga Ave. Woodland Hills, Calif. 91365 LZR-1230	12	Laser	300 by 300	16	10,000	250-sheet input	Dual-bin feeder, 500-sheet input, envelope feeder, offset jogger	Toshiba A739	Can be used as a shared office printer, data processing, word processing, spreadsheets, business graphics, label printing, transparencies	\$3,495

Product Spotlight/Page Printers

PAGE PRINTERS

Vendor/Product	Print Speed (pages/min)	Printing Technology	Resolution (dot/in.)	Number of Fonts per Page	Duty Cycle (pages/mo)	Paper Handling Features included in Price	Paper Handling Options	Print Engine	Print Applications	Price
Dataproducts LZR-2610	26	Laser	300 by 300	1	30,000	Cut sheet, dual-bin feeder, 500-sheet capacity	1,500-sheet input, sorter	Toshiba 7000 series	Tabletop printer for data processing, direct mail printing, accounting, spreadsheets, label printing	\$12,900
Dataproducts LZR-2630	26	Laser	300 by 300	Unlimited	30,000	Dual-bin feeder, 500-sheet input	1,500-sheet input, sorter	Toshiba 7000 series	Data processing, word processing, spreadsheets, label printing, transparencies	\$14,900
Dataproducts 2655	26	Laser	300 by 300	Unlimited	30,000	Dual-bin feeder, 500-sheet input	1,500-sheet input sorter/collator	Toshiba 7000 series	Computer-aided publishing, typeset proofing, graphic arts, business graphics, form/text merge	\$17,900 to \$19,900
Dataproducts 2665	26	Laser	300 by 300	Unlimited	30,000	Dual-bin feeder, 500-sheet input	1,500-sheet input, sorter/collator	Toshiba 7000 series	Computer-aided publishing, typeset proofing, graphic arts, business graphics; runs Adobe Postscript	\$22,900
Datascouth Computer Corp. P.O. Box 240947 Charlotte, N.C. 28224 Pagewriter 8	8	LED array	300 by 300	32	5,000	250-sheet input	Second 250-sheet hopper	NEC LC8000	General-purpose office printer, prints electronic forms	\$2,995
Delphax Systems, Inc. 35 Pacella Park Drive Randolph, Mass. 02368 S3000	30	Ion deposition	300 by 300 or 240 by 240	4	150,000	500-sheet input	2,000-sheet elevator	Proprietary	Lines, forms or graphics; forms generation, directional or landscape, duplex printing	\$12,000
Delphax Systems S4500	45	Ion deposition	240 by 240 or 300 by 300	4	150,000	500-sheet input	2,000-sheet elevator	Proprietary	Lines, forms or graphics; forms generation, directional or landscape, duplex printing	\$14,000
Delphax Systems S6000	60	Ion deposition	240 by 240	4	1 million	1,500-sheet input	Not available	Proprietary	General-purpose printer, directional or landscape, duplex printing, eight fonts standard	\$70,000
Delphax Systems S6000-2	75	Ion deposition	240 by 240	26	1 million	1,500-sheet input	Not available	Proprietary	Directional or landscape, duplex printing, eight fonts standard	\$72,000
Digital Equipment Corp. 129 Parker St. Maynard, Mass. 01754 LN03	8	Laser	300 by 300	30	3,000 to 4,000	250-sheet input tray	Not available	Ricoh	Desktop laser printer for team, departmental or personal printing; business graphics	\$3,495
Facit, Inc. 9 Executive Park Drive Merrimack, N.H. 03054 Opus 1	12	Laser	300 by 300	16	20,000	250-sheet bin	Not available	Ricoh	For word processing, correspondence, business graphics, bar codes	\$9,500
General Business Technology, Inc. 1891 McGaw Ave. Irvine, Calif. 92714 6630 XP	8	Laser	300 by 300	Multiple	Not available	100 cut sheets	Dual-bin sheet feeder	Canon LBP-CX	Letters, reports, forms overlay, font storage	\$4,995
General Business Technology 6600 XP	12	Laser	300 by 300	Multiple	Not available	500 cut sheets	Not available	Xerox 2700	Letters, reports, forms	\$16,495
General Business Technology 6640 XP	30	Ion deposition	300 by 300	1	Not available	1,000 cut sheets	1,500-sheet input feeder, collector	Delphax	Line printing applications	\$14,995
General Business Technology 6610 XP	60	Ion deposition	240 by 240	Multiple	Not available	2,000 cut sheets	Not available	Delphax	Letters and reports	\$61,300

Product Spotlight/Page Printers

Vendor/Product	Print Speed (page/min)	Printing Technology	Resolution (dot/in.)	Number of Fonts per Page	Duty Cycle (page/mo)	Paper Handling Features Included in Price	Paper Handling Options	Print Engine	Printer Applications	Price
Genicom Corp. 1 Genicom Drive Waynesboro, Va. 22980 5010	10	Laser	300 by 300	4	5,000	200-sheet cassette	50-sheet tray	Hitachi	Emulates Diablo 630, HP Laserjet, IBM graphics printer; full page bit-image graphics optional	\$2,995
GTC Technologies, Inc. 216 W. Florence Ave. Inglewood, Calif. 90301 Diasec	8	Laser	300 by 300	8	10,000	100-sheet input cassette	300-page output tray, collator	Canon LBP-CX	General-purpose printer available in two-user and file- user versions	\$2,995 to \$3,745
Hetra Computers & Communications Industries, Inc. 1151 S. Eddie Allen Road Melbourne, Fla. 32901 Graftex 3024	24	Laser	300 by 300	60	70,000	Combined input paper tray capacities of 2,000 sheets, offset stacking and collating	Spooling, software duplexing and multiple copies	Xerox XP-24	General-purpose printer, can be used for remote printing	\$21,500
Hewlett-Packard Co. 11311 Chinden Blvd. Boise, Idaho 83714 Laserjet	8	Laser	300 by 300	8	Not available	100-sheet paper feeder	Alternate-size trays	Canon LBP-CX	Word processing, spreadsheets	\$2,995
Hewlett-Packard Laserjet Plus	8	Laser	300 by 300	16	Not available	100-sheet paper feeder	Alternate-size trays	Canon LBP-CX	General-purpose printer for environments with graphics or electronic forms needs	\$3,995
Hewlett-Packard Laserjet 500 Plus	8	Laser	300 by 300	16	Not available	500 sheets, job offset, manual paper feeder	Alternate-size trays	Canon LBP-CX	Suited for use in a shared or local-area network environment or as a secretarial workstation	\$4,995
Hewlett-Packard HP 2688A	12	Laser	300 by 300	32	Not available	Cut sheet, simplex	Alternate-size trays	Ricoh LP4120	General-purpose printer for use with HP 3000 computer systems	\$29,950
Holoscane Corp. 2 Olsen Ave. Edison, N.J. 08820 Holoscane 28	28	Laser	300 by 300	Unlimited	20,000 to 30,000	Two paper cassettes	1,000-sheet feeder, 2,000-sheet feeder	Proprietary	Holographic imaging technology, data processing, office automation, scientific and engineering applications and electronic publishing	\$14,500
Honeywell Information Systems, Inc. 65 Walnut St. Wellesley, Mass. 02181 Page Processing System III	90	Ion deposition	240 by 240	4	700,000 to 1 million	Perforates, punches, cuts to size, collates and stacks, electronic forms and fonts standard, dynamic forms selection standard	Additional stackers	Delphax 2090	General-purpose printer aimed at high-volume data processing shops	\$280,000
Honeywell Information Systems Page Processing System II	140 to 210	Diaelectric	200 by 200	4	1.5 million to 4 million	Perforates, punches, cuts to size, collates and stacks	Electronic forms and fonts package, second toner station, stackers	Proprietary	General-purpose printer aimed at high-volume data processing shops	\$265,000
IBM Contact local IBM marketing representative 3812	12	LED array	240 by 240	Multiple	12,000 to 18,000	Primary input — 550 sheets, alternate cassette — 250 sheets	Additional cassette	Kentek	General-purpose printer, eight-user sharing card optional	\$7,500
IBM 3820	20	Laser	240 by 240	32	70,000	Primary input — 1,100 sheets, alternate cassette — 250 sheets	Not available	Proprietary	Graphics, text, forms	\$30,550
IBM 6670	36	Laser	240 by 240	5	50,000	Two input trays, primary — 2,100 sheets, alternate — 600 sheets	Not available	Proprietary	General-purpose printer	\$39,000
IBM 3800 Model 1	215	Laser	180 by 144	4	1.6 million feet	15- to 24-ft fanfold, simplex only	Burster, trimmer, stacker	Proprietary	General-purpose printer	\$215,000
IBM 3800 Model 3	215	Laser	240 by 240	64	1.69 million feet	15- to 24-ft fanfold, simplex only	Burster, trimmer, stacker	Proprietary	General-purpose printer	\$330,750
Imagen Corp. 2650 San Tomas Expy. Santa Clara, Calif. 95052 Image Station	8	Laser	300 by 300	Unlimited	5,000	Cut sheets, envelopes, transparencies	Not available	Canon LBP-CX	Merges text and graphics; serial, parallel and Ethernet interfaces	\$5,950 to \$7,200

Product Spotlight/Page Printers

PAGE PRINTERS

Vendor/Product	Print Speed (page/min)	Printing Technology	Resolution (dot/in.)	Number of Fonts per Page	Duty Cycle (page/mo)	Paper Handling Features Included in Price	Paper Handling Options	Print Engine	Printer Applications	Price
Imagen 8/300	8	Laser	300 by 300	Unlimited	5,000	Envelopes, transparencies, 100-sheet input	Not available	Canon LBP-CX	Merges text and graphics; multiuser print station; serial, parallel and Ethernet interfaces	\$8,950
Imagen 12/300	12	Laser	300 by 300	Unlimited	15,000	Cut sheets, envelopes, transparencies	Electronic page collation, page order reversal, multiple copies facility, automatic jam recovery	Ricoh	Merges text and graphics; serial, parallel and Ethernet interfaces	\$15,800
Imagen 24/300	24	Laser	300 by 300	Unlimited	40,000	Three input trays for 2,000 sheets, 500-sheet output tray with offset stacker	Not available	Xerox XP-24	Computer-aided design and engineering, techni- cal publishing and graphic arts markets; serial, parallel and Ethernet interfaces	\$29,950
Interface Systems, Inc. 5855 Interface Drive Ann Arbor, Mich. 48103 ISI Laser8	8	LED array	300 by 300	6	5,000	250-sheet input bins collate sheets automatically, prints on paper or transparencies	Second sheet feeder	Proprietary	General-purpose printer for IBM 3270 or System/34, 36 or 38 users; supports IBM Script, Professional Office System, Displaywrite and ETC/Email	\$4,495
KEL, Inc. 400 W. Cummings Park Woburn, Mass. 01801 M5311	20	Laser	300 by 300	Unlimited	50,000	250-sheet cassette	2,000-sheet hopper; face-down dual stacker with offset capability; 250 sheets each; duplex print option	Canon LBP-20	General-purpose printer, RS-232 and Centronics I/O standard; IBM 3270 coaxial, IBM System/34, 36, 38 twin axial and Data Products optional	\$14,950
Konishiroku Photo Industries Co. TMC Co. P.O. Box 423 Wayne, Pa. 19087 Konica LP-3010	12	LED array	240 by 240	Multiple	24,000	Dual input cassettes (550, 250 sheets), offset jogger	Envelope cassette	Proprietary	For use in word processing, data processing, design and accounting applications	\$7,995
Konishiroku Photo Industries Co. TMC Co. P.O. Box 423 Wayne, Pa. 19087 Konica LP-3010	10	Laser	300 by 300	8	10,000	250-sheet tray	Additional paper trays	Proprietary	General-purpose page printer for single workstation, can also be shared by multistations in a shared cluster or a satellite information system	\$3,495
Laserlink Systems, Inc. 315 Riviera Drive San Rafael, Calif. 94901 Twinax-Jet	8	Laser	300 by 300	16	12,000	Not available	Single- and triple-bin automatic feeders, envelope and label capabilities, 10-tray automatic mailbox	Canon LBP-CX	General-purpose printer for IBM System/34, 36 and 38 environment; IBM PC Network version available	\$3,790
Laserlink Systems Twinax-Jet Plus	8	Laser	300 by 300	124	12,000	Not available	Single- and triple-bin automatic feeders, envelope and label capabilities, 10-tray automatic mailbox	Canon LBP-CX	General-purpose printer for IBM System/34, 36 and 38 environment; IBM PC Network version available	\$4,790
Mannesmann Tally Corp. 8301 S. 180th St. Kent, Wash. 98032 MT910	10	Laser	300 by 300	6	5,000	Dual-bin paper input (250 sheets each)	Job separation device for multiple user applications	Kyocera	Add-on options of expanded memory, shared I/O device (handles up to four users) and expanded font capabilities	\$3,500
Megacom, Inc. 3925 Coconut Palm Drive Tampa, Fla. 33619 Megaprint	30 to 120	Laser	240 by 240	Multiple	1 million	Cut sheets	Not available	Burroughs	Printer control module manages up to four input devices or data networks and up to four output devices	\$125,000
NBI, Inc. 3450 Mitchell Lane Boulder, Colo. 80301 Model 10	10	Laser	300 by 300	4	5,000	Single bin — 250 sheets	Additional paper trays	Xerox XP-10E	General-purpose printer	\$6,495
NBI Model 12	12	Laser	300 by 300	4	15,000	Dual bin — 250 sheets per bin	Not available	Xerox XP-12E	General-purpose printer	\$17,500

Product Spotlight/Page Printers

Vendor/Product	Print Speed (page/min)	Printing Technology	Resolution (dpi/in.)	Number of Fonts per Page	Duty Cycle (page/mo)	Paper Handling Features Included in Price	Paper Handling Options	Print Engine	Printer Applications	Price
NCR Corp. 1700 S. Patterson Blvd. Dayton, Ohio 45479 6416	8	Laser	300 by 300	4	3,000	Manual or cassette sheet feed, choice of tray	Alternate-size tray	Canon LBP-CX	Diablo 630 emulation, RS-232 or Centronics parallel interface	\$2,795
NEC Information Systems, Inc. 1414 Massachusetts Ave. Boxboro, Mass. 01719 LC 800	8	LED array	300 by 300	12	5,000	250-sheet capacity, auto sheet feeder	Second bin, 250- sheet capacity	Proprietary	General-purpose printer	\$2,995
Oasy Office Automation Systems, Inc. 8352 Clairemont Mesa Blvd. San Diego, Calif. 92111 Laserpro 805	8	Laser	300 by 300	Variable	3,000	100 or 250 sheets	Not available	Ricoh 4080 or Canon LBP-CX	Word processing and simple business graphics	\$3,495
Oasy Office Automation Systems Laserpro 810	8	Laser	300 by 300	Multiple	3,000 to 6,000	100 to 200 sheets	Not available	Ricoh 4080 or Canon LBP-CX	Advanced word processing, sophisticated business graphics, bar code generation, electronic publishing, computer-aided design and manufacturing applications	\$4,295
Personal Computer Products, Inc. 11590 W. Bernardo Court San Diego, Calif. 92127 DaisyLaser 2000	8	Laser	300 by 300	Unlimited	10,000	250-sheet capacity	Alternate-size tray	Ricoh 4080	Full-page bit map graphics, emulates Diablo 630 and Hewlett-Packard's graphics language	\$3,495
Prime Computer, Inc. Prime Park Natick, Mass. 01760 QMS Lasergrafix 800	8	Laser	300 by 300	9	3,000	100 cut sheets	Alternate-size tray	Canon LBP-CX	Electronic data processing mode, daisywheel emulation, half tone, vector graphics, business graphics	\$9,500 to \$12,000
Prime Computer QMS Lasergrafix 1200	12	Laser	300 by 300	9	15,000	250-sheet capacity	Alternate-size tray	Xerox 2700-II	Daisywheel emulation, half tone, vector graphics, business graphics	\$22,500 to \$24,500
Prime Computer QMS Lasergrafix 2400	24	Laser	300 by 300	9	30,000	1,500-sheet capacity	Alternate-size tray	Xerox XP-24	Daisywheel emulation, half tone, vector graphics, business graphics	\$32,000 to \$34,500
Pritronix Corp. 17500 Cartwright Irvine, Calif. 92714 LP20	20	Laser	240 by 240	96	100,000	Two 250-page cassettes	2,000-sheet feeder, stacker and sorter	Fujitsu	General-purpose printer	\$11,995
QMS, Inc. 1 Magnum Pass Mobile, Ala. 36618 Kiss	6	Laser	300 by 300	9	3,000	100-sheet input tray, business cards, labels and transparencies	Two additional trays 175 sheets each, envelope tray with 75 envelopes and a face-down stacker	Canon LBP-CX	Desktop printer produces graphics and office forms, emulates Epson FX- 80, Qume Sprint and Diablo 630	\$1,995
QMS Smartwriter	8	Laser	300 by 300	7	3,000	100-sheet input tray, business cards, labels and transparencies	Two additional trays 175 sheet each, envelope tray with 75 envelopes and a face-down stacker	Canon LBP-CX	Desktop printer emulates Qume Sprint, Diablo 630, Epson FX-80 and supports ANSI commands; downloadable font capabilities; handles logos and graphics	\$3,850
QMS PS 800	8	Laser	300 by 300	16	3,000	100-sheet cassette, business cards, some label stock	Not available	Canon LBP-CX	Executes programs in graphics programming language, suitable as typesetting tool for electronic publishing	\$5,895
QMS Lasergrafix 800	8	Laser	300 by 300	16	3,000	100-sheet cassette, business cards, some label stock	Not available	Canon LBP-CX	Capable of industrial graphics, business graphics, on- demand printing and special logos	\$7,995
QMS Lasergrafix 1200	12	Laser	300 by 300	16	30,000	Dual cassettes, 250 sheets each	Not available	Xerox 2700	Capable of handling industrial and business graphics	\$19,995

Product Spotlight/Page Printers

PAGE PRINTERS

Vendor/Product	Print Speed (page/min)	Printing Technology	Resolution (dot/in.)	Number of Pages per Page	Duty Cycle (page/mo)	Paper Handling Features Included in Price	Paper Handling Options	Print Engine	Printer Applications	Price
QMS Lasergrafix 2400	24	Laser	300 by 300	16	30,000 to 50,000	2,000-sheet input capacity; 1,500- sheet paper feeder, two 250- sheet front-loading cassettes; automatic collation, job offset capability	Not available	Xerox XP-24	Industrial graphics; business graphics; word processing; on-demand printing; plotting; emulates Qume Sprint, Diablo 630, DEC TEX, Tektronix, Calcomp	\$29,995
Quadram Corp. One Quad Way Norcross, Ga. 30093 Quadlaser	8	Laser	300 by 300	Unlimited	10,000	250-page capacity	Alternate-size trays	Ricoh 4080	Optional forms generation, font library	\$3,795
Qume Corp. 2350 Qume Drive San Jose, Calif. 95131 Laser Ten	10	Laser	300 by 300	19	5,000	250-sheet tray	Envelope feeder, six-bin sorter	Hitachi	Compatible with major business computers and word processing systems, including multiuser systems and networks	\$2,795
Qume Laser Ten Plus	10	Laser	300 by 300	19	5,000	250-sheet tray	Envelope feeder, six-bin sorter	Hitachi	Extended graphics image size and flexibility	\$3,395
Ricoh Corp. 5 Dedrick Place West Caldwell, N.J. 07006 LP4080R	8	Laser	300 by 300	32	10,000	250-sheet input capacity, transparencies and labels	Not available	Ricoh 4080	Word processing, spreadsheet, data base and business graphics applications; forms overlay	\$3,495
Siemens Information Systems, Inc. 240 E. Palms Road Anaheim, Calif. 92805 2200-I	103	Laser	180 by 144	Multiple	1.5 million	3,600-sheet capacity	Cutter, trimmer, roll feed	Proprietary	Optical forms overlay, emulates IBM 3800 laser printers, cold fusion technology	\$170,000
Siemens Information Systems 2200-II	103	Laser	240 by 240	Multiple	1.5 million	3,600-sheet capacity	Cutter, trimmer, roll feed	Proprietary	Optical and electronic forms overlay, emulates IBM 3800	\$189,000
Siemens Information Systems 2300-II	103	Laser	240 by 240	Multiple	3 million	2,100-sheet capacity	Cutter, trimmer, roll feed	Proprietary	Compatible with IBM, emulates IBM 3800, optical and electronic forms	\$283,500
Siemens Information Systems 2300-I	206	Laser	180 by 144	Multiple	3 million	2,100-sheet capacity	Cutter, trimmer, roll feed	Proprietary	Compatible with IBM, emulates IBM 3800, optical forms overlay	\$265,000
Southern Systems, Inc. 100 N. Belcher Road Clearwater, Fla. 33575 Mercurion 1	75	Ion deposition	240 by 240	8	500,000 to 750,000	Dual sheet feeders: 1,500 — primary, 400 — alternate; job separator	Not available	Delphax	General data processing printer, raster image forms overlay	\$60,000
StorageTek 2270 S. 88th St. Louisville, Colo. 80028 6100	103	Laser	240 by 240	4	1 million	Power stacker	Splicing station	Proprietary	Suited for both general-purpose and vertical markets, cold fusion technology	\$195,000
Talaris Systems, Inc. 5160 Carroll Canyon Road San Diego, Calif. 92121 T800	8	Laser	300 by 300	Multiple	10,000	100-sheet capacity	Alternate-size tray	Canon LBP-CX	Full page bit- mapped graphics, supports all Talaris T1200 and T2400 software	\$7,990
Talaris Systems T810	8	Laser	300 by 300	Multiple	10,000	100-sheet capacity	Alternate-size tray	Canon LBP-CX	Word processing, data processing, emulates Epson FX- 80, simple business graphics	\$3,850
Talaris Systems T1200	12	Laser	300 by 300	Multiple	30,000	Two cassettes — 250 sheets each	Alternate-size tray	Xerox XP-24	Word processing, data processing, electronic publishing	\$19,990
Talaris Systems T2400	24	Laser	300 by 300	Multiple	30,000	1,500-sheet input stacker, two 250- sheet cassettes	Alternate-size tray	Xerox XP-24	Word processing, data processing, electronic publishing	\$29,990
Telfile Computer Products, Inc. 17131 Daimler St. Irvine, Calif. 92714 T3487LZ	10	Laser	300 by 300	22	Not available	Output sequencer, input paper cassette	Envelope and other size paper trays	Xerox 4045	General-purpose printer, bit-mapped graphics	\$6,075

NOW, YOU'LL NEVER FORGET TO CHECK YOUR ELECTRONIC MAILBOX AGAIN.

INTRODUCING GET!

PC COMMUNICATIONS SOFTWARE THAT NEVER FORGETS.

Mail services are great; it's the electronic postman that has the problem... he doesn't deliver. You miss the message because you don't even know it's there. That's why we created Get!, the first IBM Personal Computer communications program that automatically remembers to check your electronic mailbox. So you don't have to.

"NO-HANDS" SOFTWARE.

Get! is "memory resident," so once you turn your PC on it loads into memory all by itself. Then, at the time or times you've told it, Get! wakes up your modem, dials the mail service or central computer, and checks to see if you have mail. All the while you can be happily working on your word processor. Or not working on your computer at all.

If you have no mail, you're not bothered. Get! waits to check again later. But if messages are found, a "mail waiting" signal flashes in the corner of your PC's screen. Right through almost any other program you might be running.

ON-LINE. ON DEMAND.

Once Get! finds something, fetching it for you is easy. Simply tap the [Alt] and [G] keys and a summary of your mail pops-in on the screen. Without having to leave the program you're working on. One more keystroke and all the log-on, password, and service command nonsense is taken care of. Instantly. Now you can read your mail, respond, print,

store messages to disk...do virtually everything you did with that old fashioned modem program you hate to use. But much faster. And much easier.

When you're finished, tap a function key. You'll be popped right back to your other program. Exactly where you left it. And Get! will go back into hiding.

POWER. IN DISGUISE.

By now you may have guessed that Get! is more than a mail checker. We worked hard to disguise its power, so you wouldn't have to work hard to use it. With features like an easy text editor you can use on- or off-line to prepare messages. Up-loading from disk to automatically send files you've already cre-

ated. XMODEM protocol for error-free file transfers. Two-button talking with other programs like Crosstalk and Smartcom. Pre-defined mail finding sequences for 12 popular electronic mail services*. And a powerful script language to create your own custom series of communications commands for the in-house computer, your local bulletin board, or lesser known services.

Perhaps the best example of Get!'s powerful disguise lies in its one-time set-up procedure. Copy

Get! to the disk that starts your computer, and put "get" in your autostart (autoexec) file. Type "get," pick the mail service or services you belong to, tell us their phone numbers and passwords... that's it. Now, every time you turn your PC on, Get! checks your mailboxes.

FORGET FORGETTING. FOREVER.

If you never use your electronic mail system because it's too hard or you can't depend on messages getting delivered, tell your friends (or your company computer manager**) to buy Get! Miss important Telex's because you forgot to check your mailbox? Give yourself a break. Even if you don't use electronic mail but would like an extremely easy yet powerful on-demand communications program, Get! is the answer.

From now until June 1st, Get! will make your communications work better for peanuts. Only \$89.95

Order today and save a little money and a lot of frustration. Because the sooner you buy Get!, the sooner you can tell your electronic mailbox to go check itself.

Order Today, Toll Free:
(800) 621-4292
(800) 331-9113 in California

Get!

CW 42105

Please send me Get!

Quantity @ \$89.95 ea.

+ 5.00 Shipping and handling

Total Enclosed

(CA Residents: please add sales tax)

Send to: Cygnet Technologies, Inc. Dept. GET!
1296 Lawrence Station Road
Sunnyvale, CA 94089

CYGNET.

Handy Software for Busy People

☐ Check ☐ Visa ☐ MasterCard

Card Number _____ Expiration Date _____

Name _____

Address _____

City _____ State _____ Zip _____

Phone _____

Outside US add \$10 for shipping and handling. Sorry no COD's. P.O.'s on orders of 10+ only. Corporate quantity discounts and liberal site license plan available.

30-Day Money-Back Guarantee

*Predefined message finding for EasyLink, MCI Mail, ITT Dialcom, The Source, Compuserve, GE Quickcom, GeNIE, GTE Telemail, Tymnet's OnTime, IBM Mail Network, GEM and ATT Mail.

**Attention Corporate Email Users: Site Licenses and custom Get! configurations are available. Please call for details.

System Requirements: IBM or compatible PC, 128+ memory, DOS 2.0 or later, 1 disk drive. Hayes compatible modem required. Uses <64k memory. Get! is a trademark and Cygnet is a registered trademark of Cygnet Technologies, Inc. Other brand names are trademarks of their respective manufacturers. ©1986 Cygnet Technologies, Inc.



Product Spotlight/Page Printers

Vendor/Product	Print Speed (page/min)	Printing Technology	Resolution (dot/in.)	Number of Fonts per Page	Duty Cycle (pages/mo)	Paper Handling Features Included	Paper Handling Options	Print Engine	Printer Applications	Price
Telefile Computer Products	12	Laser	300 by 300	Not available	Not available	Dual input, 250 sheets each	Alternate-size tray	Xerox 2700	Graphics, IBM 2770, 2780, 3780 emulation	\$19,995
T2463 Laser Printer										
Telefile Computer Products	24	Laser	300 by 300	16	Not available	Dual input paper cassettes, output stacker	Not available	Xerox 3700	General-purpose printer	\$39,280
T7467LZ										
Tempest Technologies, Inc. 11411 Isaac Newton Sq. S. Reston, Va. 22090	26	Laser	300 by 300	Unlimited	50,000	Dual cassettes	1,500-sheet power cassette, powered face-down output tray and sorter	Toshiba	Three models: line printer emulation, Diablo 630 emulation, programmable text and graphics emulation	\$19,500
LZR5600 series										
Versatec, Inc. 2710 Walsh Ave. Santa Clara, Calif. 95051	17	Electrostatic	200 by 200	2	5,000 to 10,000	Paper or film	Cut-sheet or continuous paper	Proprietary	General-purpose color or monochrome printer/plotter	\$11,950
Spectrum										
Versatec Versatec V-80	Not available	Electrostatic	200 by 200	2	5,000 to 10,000	Paper or film	Cut-sheet or continuous paper	Proprietary	General-purpose monochrome printer/plotter	\$8,950
Wang Laboratories, Inc. One Industrial Ave. Lowell, Mass. 01851	8	Laser	300 by 300	3	3,000	Two-sided copy, 100-sheet capacity	Alternate-size trays	Canon LBP-CX	General-purpose printer, more than 90 fonts	\$5,000
LPS 8										
Wang LPS 12	12	Laser	300 by 300	2	15,000	Offset stacker, 250-sheet input tray	Not available	Xerox 2700	General-purpose printer, more than 90 fonts	\$20,000
Wang LIS 12	12	Laser	300 by 300	99	15,000	Offset stacker, dual-cassette input	Not available	Xerox 2700	General-purpose printer features graphics	\$26,000
Wang LIS 24	24	Laser	300 by 300	99	30,000	Offset stacker, two cassettes—1,500 sheets, 250 sheets	Not available	Xerox XP-24	General-purpose printer features graphics	\$30,000
Xerox Corp. 101 Continental Blvd. El Segundo, Calif. 90245	10	Laser	300 by 300	22	2,000 to 10,000	250 cut sheets	Envelope feed	Proprietary	150 by 150 dot/in. graphics, Diablo 630 and Xerox 2700 II emulation	\$4,995
Model 4045 CP										
Xerox Model 2700 II	12	Laser	300 by 300	Multiple	15,000	Dual input, 250 sheets per tray	Not available	Proprietary	Remote print management facility, Xerox forms description language	\$14,495
Xerox Model 3700	24	Laser	300 by 300	16	40,000	2,000-sheet stacker, dual input, 250 cut sheets per tray	Not available	Proprietary	For distributed data processing, includes 10M-byte Winchester 5½-in. floppy drives	\$29,995
Xerox Model 4050	50	Laser	300 by 300	44	750,000	1,000 cut sheets, 500-sheet auxiliary tray	Not available	Proprietary	IBM 3811 or 3211 line printer interface, on-line or off-line operations, Xerox Interpress language	\$140,500
Xerox Model 4060	60	Ion deposition	240 by 240	8	500,000	2,500 cut sheets	Not available	Delphax	Forms description language, print manager	\$70,000
Xerox Model 8700	70	Laser	300 by 300	Multiple	400,000	2,500 cut sheets	500-sheet tray	Proprietary	Two 25M-byte disks, optional magnetic tape unit for off-line printing	\$212,000
Xerox Model 9700	120	Laser	300 by 300	Multiple	900,000	2,500-sheet stacker, labels, cards	Expanded tray	Proprietary	Duplex printing for IBM 360, 370, optional graphics input station	\$390,000



Doesn't your IBM PC deserve IBM service?

You chose an IBM Personal Computer for lots of good reasons. And now that you depend on it to help keep your office running smoothly, doesn't it make sense to help protect your investment with blue chip service from IBM?

No matter what IBM PC you have, blue chip service is more than just expert repair.

Blue chip service offers the choice of service that's right for you at the price that's right for you. It means we'll exchange your monitor, for example, at your place or at any of our Service/Exchange Centers.

And blue chip service means a lot of things you don't see. Quality. Speed. Commitment. And IBM experience. Every year IBM invests many hours of training to keep its service representatives current on technologies that never stand still.

As an IBM customer you deserve blue chip service. It's the best thing you can do for your IBM Personal Computer.

For more information, use the coupon or call 1 800 IBM-2468, Ext. 90, and ask for the Service/Exchange Maintenance Department.

Blue chip service from **IBM**


IBM Direct
Service/Exchange Maintenance Dept.
One Culver Rd.
Dayton, NJ 08810

98-6-21

☐ Please send me more information on IBM PC service.

Name _____ Title _____
Company _____ Phone _____
Address _____
City _____ State _____ Zip _____

The case for fault tolerant transaction processing.



Ask anyone who is seriously involved in OLTP (on-line transaction processing) what worries them most and they'll give you one consistent answer, "system failure." That's when the domino theory goes to work. Because when the computer goes down, your whole operation goes down with it.

Now ask them what they look for most in an OLTP computer and, again, they'll answer with amazing consistency, "affordable power."

So, it should come as no surprise that when people learn Stratus makes the most complete, cost-effective, on-line system featuring hardware-based fault tolerance, they respond, intelligently enough, by buying it.

What is surprising is the fact that Stratus computers are priced lower than many others that offer less power and no fault tolerant architecture.

If you're seriously looking at OLTP systems, do what so many others have already done—pick Stratus. Because we make the most reliable computer for cost-effective transaction processing in the world.

Let us show you how a Stratus fault tolerant transaction processing computer can keep your operation up and running profitably full time. Call our Marketing Services Dept. at 800-752-4826. In MA 800-221-6555.

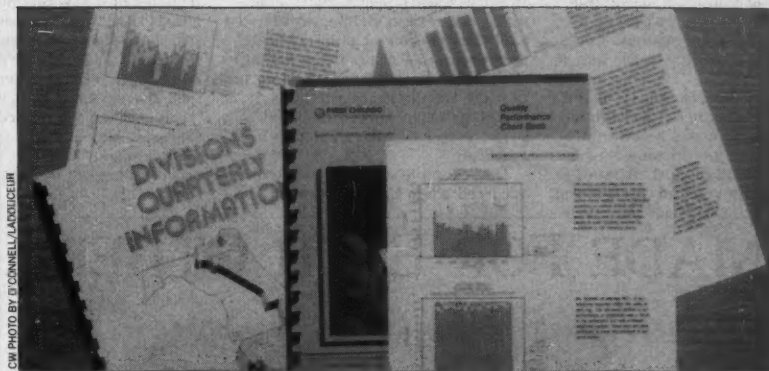
Stratus®

The most cost effective fault tolerant
OLTP computer you can buy.

Stratus Computer Inc., Marlboro, MA 01752

In Depth

Million-dollar graphics



Visual information systems turn data bases into graphic information. Not only can graphics applications save corporate time and money, but they also are another step toward converting data processing into a strategic and competitive weapon.

By ALAN PALLER

What computer application offers companies a million dollars in savings, improved sales effectiveness and happier customers?

What computer application offers senior management immediate access to key performance indicators, allowing them to reinforce outstanding performance quickly and anticipate weak performance before it becomes critical?

What computer application amplifies the value of data, giving senior management a reason to increase investment in information systems rather than reduce the funds being poured into data processing?

One answer is the single technology known as "visual information systems," which combines computer graphics with data bases. Your organization may be one of the plurality that has discovered computer graphics, but only from a "pretty pictures" view. Yet some major organizations have gone beyond pretty pictures.

The case studies presented in this article highlight an important trend toward visual information systems, which turn data bases into information. The case stories reflect the fact that, to the people who receive information, time is money. By providing visual information rather than traditional printouts, these organizations can convert their data processing departments into strategic and competi-

tive weapons.

The applications performed by these companies are not unique, but they are uncommon. Too few organizations consider information processing departments to be strategic weapons. Too many think of data processing as a technology that is important but costs too much money. In contrast, the organizations described here see data processing as a tool that can help their companies gain market share, improve executive effectiveness and reduce costs.

In most cases, I name the organizations that have implemented strategic applications. In a few cases, however, I provide a pseudonym. The companies that have chosen to remain anonymous are no less successful than those willing to be identified. To the contrary, some have found their visual information systems so strategic that they are not willing to allow their competitors to know exactly what they are doing with the technology.

The General Motors Corp. Treasurer's Office provides a case in point. *Business Week* magazine reported that senior officials in GM's treasurer's office said, "We consider our financial decision support system [which is a visual information system] to be so strategic that we will not discuss it publicly."

Leadership role

First Chicago Corp. is one of America's top 10 banks in terms of assets and is the leading bank in the Midwest. The bank is also a major player in commercial banking globally. Despite intense competitive forces, First Chicago continues to excel and maintain its leadership role.

The bank has used computer graphics for five years, in an application called "Performance Measurement Graphics." This visual information system focuses on improving the

Paller is president of AUI Data Graphics in Washington, D.C., and a director of the National Computer Graphics Association (NCGA). NCGA's Computer Graphics '86 conference, May 11-15 in Anaheim, Calif., will highlight several of the applications mentioned here.

In Depth/Million-Dollar Graphics

quality and productivity of the bank's services to clients. Weekly, it tracks more than 700 performance indicators that customers consider important.

To initiate the system, each business unit in the bank identified the indicators that measured how customers perceived the bank's timeliness, accuracy and customer service responsiveness. For each indicator, the bank managers established a goal and a level of minimum acceptable performance. Then they designed charts to gauge each business unit's performance according to the indicators.

Each of the charts that show outstanding performance (levels above goal), problems (levels below minimum acceptable performance) or a substantial trend toward either of those, are displayed and discussed at

weekly senior management meetings. Because a staff meeting with charts makes success so visible, the charted goals have become a point of pride and a source of competition among the business unit managers. More important, the charts highlight early warnings when something is amiss, so corrective action can be taken quickly.

One example of corrective action occurred when the business unit

manager for First Chicago's money transfer unit saw on one of the charts that the response time for telephone-initiated money transfer requests was on the increase. The manager, having isolated the problem, analyzed it, found where peak period backups were occurring and shifted staff resources to meet the peak demand. As a result, performance improved beyond its previous high levels.

Because a staff meeting with charts makes success so visible, the charted goals have become a point of pride and a source of competition among the business unit managers.

The bottom line on First Chicago's performance measurement charts is a significant reduction in the cost of cash management services. The bank estimates that performance management helped cut the cost of error correction from 21% to 10% of total production costs, resulting in savings of more than \$1 million. Reduced costs allowed the bank to hold the price of services relatively unchanged for several years, giving First Chicago a better competitive market position.

Charts form the conveyor belt along which performance measurement is carried. The program improved the bank's competitive position in one other way. By reducing the number of errors that were made, the bank lowered the overall cost to its customers of doing business with First Chicago. Performance improvements resulted in a decline in the customers' internal expenses for correcting errors. By setting one of the highest standards for accuracy in the industry, First Chicago has become even harder to beat.

All this quality improvement, however, would be useless if the customers were not aware of the progress the bank had made.

First Chicago solved this problem by publishing a Quality Performance chart book for its customers, showing charts of approximately 100 of the most important indicators, along with brief descriptions of the progress made in each indicator. The Quality Performance chart book turned into one of the bank's most powerful marketing tools because it makes the bank's commitment to quality visible.

Keen eye

Hardees Restaurants' flourishing fast-food empire is expected to achieve sales of \$2.2 billion in 1986. This success is a product of the company's keen eye on the competition and close watch on the public's appetite. Computer graphics at Hardees headquarters is considered a crucial analysis tool when deciding on substantial investments such as building new outlets or introducing a new hamburger.

Before Hardees launched a recent successful expansion program in a southern state, the company divided the state into designated market areas. Color-coded graphics showed the market penetration of each competitor, tracking expansion or reduction of hundreds of outlets in various areas. Hardees' development department used the information to study the reasons underlying competitors' moves and to target the state's most promising locations for Hardees outlets.

For the average fast-food customer, forgoing a hamburger in December is an economic decision involving a couple of dollars. For Hardees' 850 company stores and 1,600 franchises, maintaining correct inventory levels for summer rushes and slower winter months adds up to millions of dollars and tons of food.

Before visual reporting, printouts showed product managers the sales numbers. Tracking sales with charts, however, shows seasonal sales cycles and the impact of product advertising, so Hardees can invest in the right amount of inventory and keep on top of which products are doing well.

Presenting information in visual format became the expected

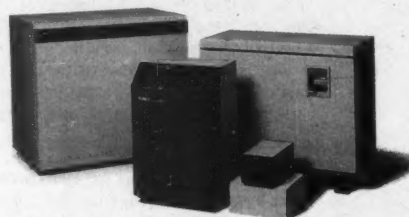
MADE FOR EACH OTHER.



Just like Topaz Power Conditioners and your computers.

Noise transients, voltage fluctuations, blackouts—all are problems for computers. But Topaz eliminates these problems with a full range of products: LINE 2® Power Conditioners, ULTRA-ISOLATOR® Noise Suppressors and POWERMAKER® Uninterruptible Power Systems.

Reliable. Affordable. Efficient. Our products are ideal for use with all computers, from micros to mainframes. Call us today at (619) 279-0831. After all, we're made for each other.

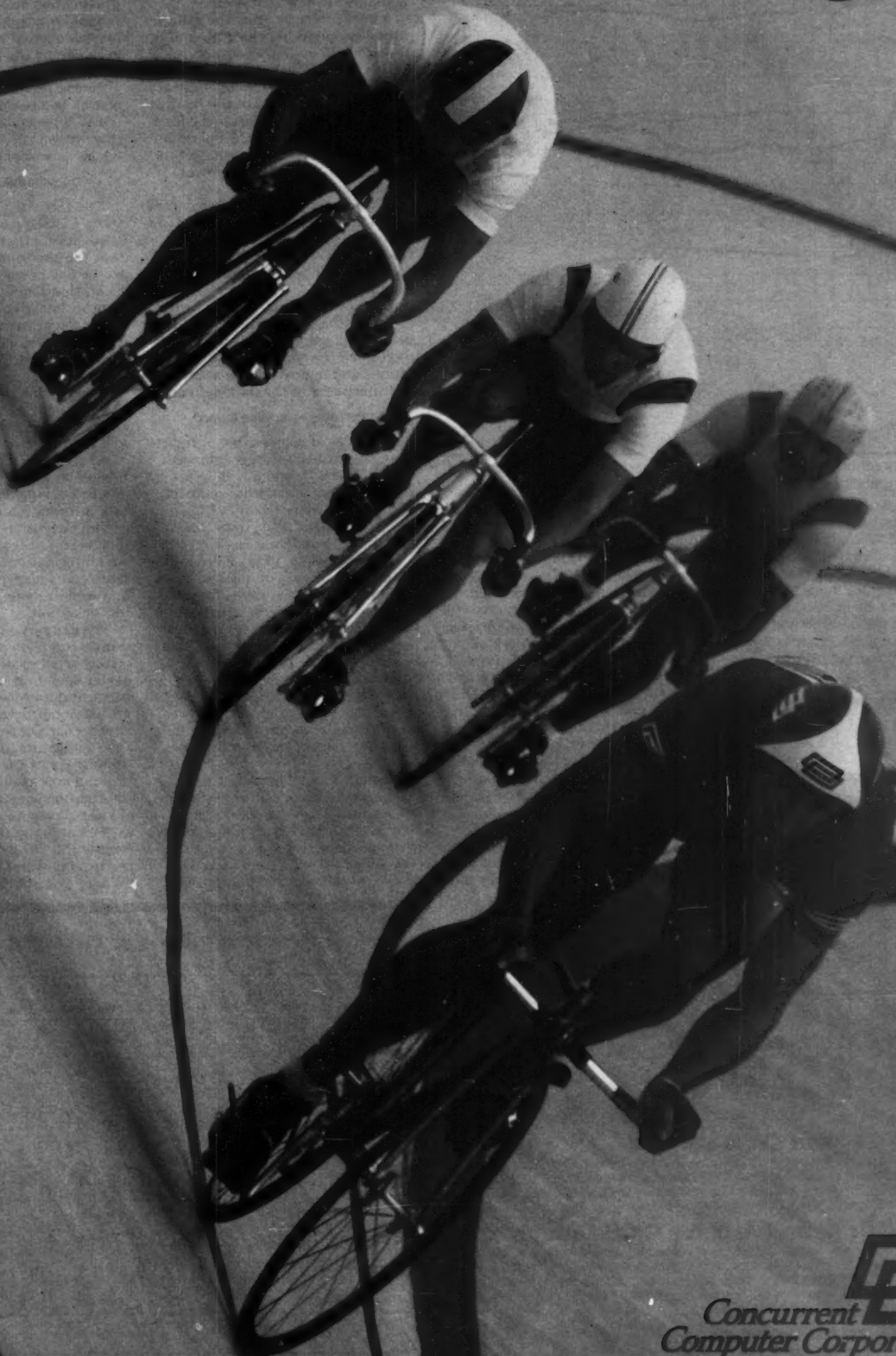


TOPAZ®

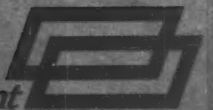
Excellence in Computer Power
A Subsidiary of the Square D Company

For your FREE copy of our 16" x 20" MADE FOR EACH OTHER poster, please tear out this ad and send it to us along with your name and address.
Mail to: Topaz, Inc. 9150 Topaz Way, San Diego, CA 92123-064.

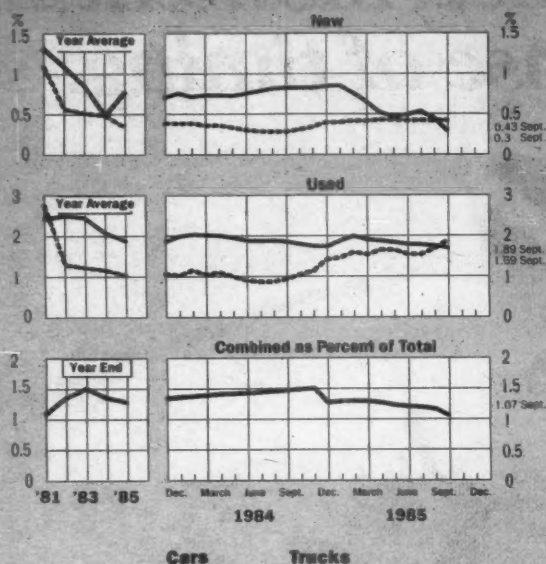
***Breaking away from the pack
requires confidence, momentum
and a keen sense of timing.***



**Concurrent
Computer Corporation**



In Depth/Million-Dollar Graphics

General Motors Acceptance Corp. —
U.S. sample plot data

General Motors managers carry a pocket-size chart book with 200 pages of sophisticated graphics showing sales and operations trends.

reporting format at Hardees — from ad hoc studies by analysts to the "board book" of 50 tables and charts showing monthly results that was distributed to senior managers. At Hardees, management considers visual reporting the best method for retrieving information from computer memory and storing it in human memory.

Management data delivery

Florida Power & Light Co. was recently singled out by *Business Week* (Nov. 11, 1985) as one of America's best-managed utilities. Part of the explanation for the utility's extraordinary management reputation may be the unique way that its management data is delivered. The utility uses chart books instead of piles of printouts to determine how well it is performing, where it can improve and what to forecast for 10 years from now.

During the past three years, the output for five different manage-

ment systems has been converted from tabular to graphic:

- The utility's Quality Improvement Program organizes employees into teams to review various facets of operation and to suggest ways to improve performance. Each quarter, hundreds of computer-generated graphics delineate the effectiveness and participation of the groups and show the status of actions that they have recommended. The Quality Improvement Program is designed to help Florida Power & Light meet its stated goal: "During the next decade, we want to become the best-managed electric utility in the United States, and be recognized as such."

- "The Energy and Customer Forecast" chart book provides 10-year projections, taking into account Florida's demographic trends, its demand for electric power and the effectiveness of the utility's conservation programs.

- "The Material Management Inventory Tracking" chart book helps

to lower holding costs while providing higher inventory turnover and better service levels. Charts show levels of availability and demand for each type of part in inventory. The chart book provides an easy way to analyze whether the utility has the right parts on hand and helps the utility maintain reliable service to its existing customers as well as timely hookups for new customers.

- In the nuclear area, the utility provides a monthly chart book of up-to-date data on power output, reliability, operating efficiency and safety-related information, based on the recommendations of the Institute for Nuclear Power Operations. Similar chart books cover the operation budget and performance indicators of the utility's fossil fuel power plants.

- A quarterly chart book from the Division of Planning and Administration covers a comprehensive range of information from new service accounts to cost per customer of supplying power.

Each of these chart books progressed through several stages of development, gaining new indicators, increasing the complexity of presentations and improving the accuracy and timeliness of the data delivery.

Portable reference library

In this most competitive of industries, General Motors Acceptance Corp. (GMAC) found a way to provide its executives with a compact, portable reference library of business-related statistical data that is continuously updated.

GMAC's system provides ready availability of data on interest rates, cost of funds, key statistics and important performance measurements. It provides this up-to-date information to its executives in a form that is usable outside the office: in cars, on planes, at home or at customer sites. The delivery system is a pocket-size chart book, 3½ in. by 5½ in., which is distributed to the top 70 managers. The chart book provides clear, concise and portable graphics representations of operations.

The booklets come in seven different series, containing 200 pages of charts, many with multiple graphics per page. Some cover passenger car financing in the U.S. and Canada, others cover truck and equipment

financing, and others cover general financial and economic indicators. The charts are detailed, containing both long- and short-term trends as well as current information (see chart at left).

Although GMAC published management chart books for more than 35 years, the reliance on manual processes restricted the degree of sophistication and depth of the charts. Computer graphics removed the delays associated with manual processes, allowing the pocket chart books to reach their full potential.

In competitive situations, information is a powerful weapon. GMAC's pocket chart books provide that weapon at the time and place where it is most needed.

On schedule, within budget

The U.S. Air Force Systems Command (AFSC) manages a \$40 billion acquisition program. It must ensure that the government gets its money's worth from every AFSC procurement, that new technology is used appropriately and that contractors stay on schedule and within budget.

AFSC developed an Executive Information System with four overall goals:

- Improving information access.
- Automating and standardizing the flow of validated requirements and reports.
- Standardizing commands for information handling.
- Preserving and sharing corporate information resources.

The Executive Information System meets these goals through a visual information delivery system, which uses a graphics user interface and well-designed graphics summaries for output.

The delivery system, which contains a complete relational data base management system, covers manpower spending and program management data for every major AFSC acquisition program. The system also covers contract schedules, management indicators of performance, funding levels for research laboratories and dozens of other management information sources. The system can answer thousands of questions, such as, "What is the fiscal status of that program?" "Which contractors are performing worst/best?" And, "Where else are those contractors

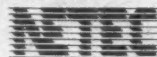
Uptime

Provide 24 Hour CICS Service

IBM gave dynamic file allocation to CICS... but you need Netec's CAFC to make non-stop, round-the-clock CICS a reality. CAFC allows a single command to OPEN or CLOSE 5 or 50 files and to enable or disable the transactions. It allows CICS and your batch programs to automatically add, remove and share files.

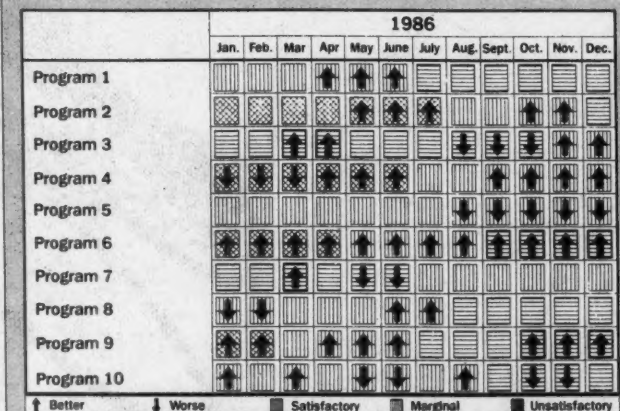
Browse, Print and Archive CICS Dumps

The CICS Dump Display Facility offers a variety of access modes for transaction and formatted dumps. You may view or print any dump without disturbing CICS. You may selectively inhibit dump generation or archive the dumps for after-the-fact off-line analysis. CDDF automatically switches the dump data sets for you.



Netec International, Inc.
P.O. Box 18538 • Dallas, TX 75218
(214) 324-2848 • Telex 314419 TELECOM UD

Program manager assessment



Source: Bloz, Allen & Hamilton, Inc.

Successful graphics for senior managers show more than progress reports: They compare the current status of specific projects with management goals.

**We're making our move
with an emerging technology
and over \$260 million in sales.**

**We're Concurrent Computer
Corporation.**



A new computer company that's a born winner. Experienced, formidable, innovative. Making a move you'll find impossible to ignore.

Concurrent Computer Corporation. The logical evolution of the Perkin-Elmer Data Systems Group, with over a decade of experience in high performance, high reliability 32-bit superminicomputers. A track record of profitability and solid sales growth. A worldwide presence with worldwide support.

Plus a commitment to parallel processing technology that's so complete, we named our new company for it.

We don't just talk about parallel processing. We're already doing it, with over 300 installations up and running in both technical and commercial applications. In fact, Concurrent Computer Corporation has delivered over 55% of all the parallel processing solutions operating today.

And that's only the beginning. Now watch us make our move.



We've poured on Parallelism that leave Uniproc

In the high performance race for computing power, uniprocessing doesn't stand a chance. Not against Concurrent Computer Corporation's innovative, proven parallel processing concepts.

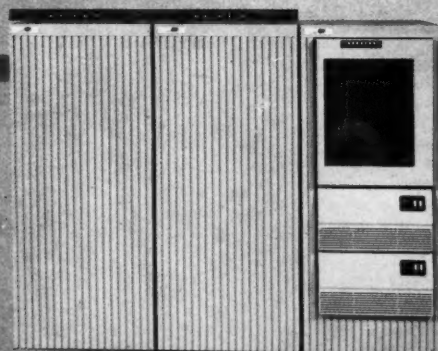
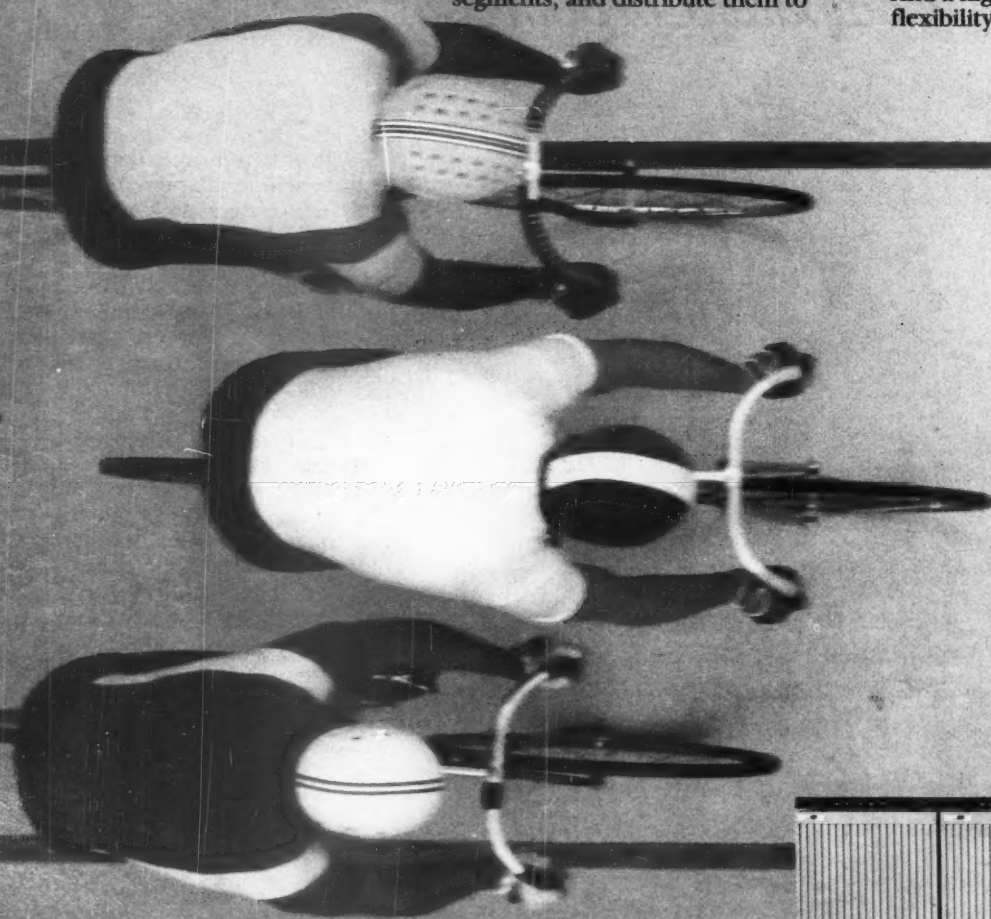
How parallelism works.

Every large application is made up of many interdependent tasks. A uniprocessing serial approach would execute them one at a time. Instead, we divide them into related segments, and distribute them to

multiple real-time processors.

Some handle I/O or transaction processing. Others execute number crunching or maintain a database. But all work concurrently. And far more efficiently.

The advantages are clear. Computing performance is maximized, with dramatic increases in speed and throughput. No more I/O bottlenecks. The use of multiple processors provides inherent built-in availability. And a high degree of configuration flexibility. At a minimal cost.



Parallel Processing Solutions Processing in the dust.

Unlimited potential. Unlimited growth.

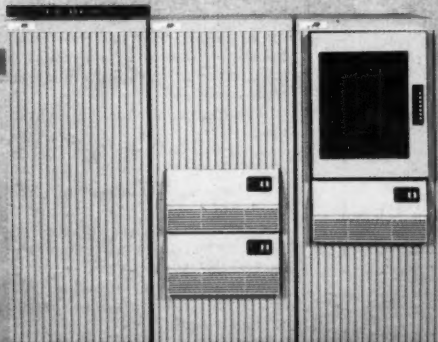
With a single machine, you're always bound by limitations. Either you're overcompensating, or you're compromising. But with our unique parallel processing solutions, you get just the computing power and speed you need. No more. No less.

If your present computing application demands uniprocessing, you can begin with our uniprocessors and then upgrade to parallel processing later on. And Concurrent Computer Corporation can let you make this transition easily.

When you're ready for expansion, you can plug in auxiliary processors with minimal redundancy. And without software changes. So you grow at your own pace. Incrementally. And very economically.

Not just in the low cost of adding additional processors. Not just in software protection. But in every aspect of your installation, from overhead to footprint to operating costs.

The race is on. And it looks like Concurrent Computer Corporation is about to take the lead.



**Concurrent
Computer Corporation**

In Depth/Million-Dollar Graphics

working on AFSC programs?"

Graphics are central to the success of the Executive Information System. The system contains so much information at so many levels that end users would get lost in a traditional user interface. But AFSC's user interface displays an organizational chart format, so end users can see where they are at any time. The organizational chart shows available graphics information displays rather than divisions or departments. Each move through this information architecture chart elicits a new set of relevant displays and shows how they relate to other information in the system.

Excellent client relations

Aerocorp is a pseudonym for one of the major aerospace companies that contracts with the government

to supply weapon systems. The competitive edge in aerospace contracting comes from a combination of getting jobs done on schedule and maintaining excellent relations with the client through open communications. Aerocorp must also write proposals that help the company win add-on business and new business.

Aerocorp found one visual information system application that helps them solve three key problems: developing winning proposals, getting projects done on time and within budget and maintaining open communications with the client.

The application, called Visual Project Scheduling and Control, consists of a series of approximately 70 different graphics designs that answer important questions about the status or the plan of every major program. Some charts provide sched-

ules with cost and cost variance analysis. Others show trends in spending, staff requirements by category, staff requirements vs. availability and general staff loading levels.

The system produces charts for the bid and proposal stage, and it produces weekly and monthly summary charts for all ongoing projects. The delivery system represents a major step beyond traditional project management systems because the visual formats make the data in the project plan and project performance visible at the top levels of the organization and to the client. No longer are the project details hidden in thick printouts or in the minds of a few knowledgeable staff members. With visual project monitoring, both the organization and the customer know the status and participate in

making sure projects are successful.

According to Aerocorp managers, visual project scheduling and monitoring provides five benefits in the program planning area and seven benefits in the program management area. In program planning, the benefits are as follows:

- It provides better evaluation of decisions on whether or not to bid on new projects.
- It indicates whether required staff is available for the projects.
- It justifies cost estimates for proposals.
- It creates low-cost, high-quality graphics for proposals.
- It identifies the projects' critical paths.

In the program management area, the visual information system offers the following benefits:

- Coordination of different programs over common operations.
- Cost control through planned data monitoring of past, actual and predicted data.
- Accurate predictions for staff requirements, both current and future.

”

In competitive situations, information is a powerful weapon.

- Predictions of manufacturing capacity bottlenecks.
- A defined critical path for monitoring project task times.
- Monthly customer program status reports graphically generated so the customer understands them.
- Top management communications tools for senior management to determine who to reward and where problems are emerging before those problems become crises.

The impact of visual project scheduling and monitoring can be seen in the speed with which people took advantage of the system. Within 90 days after the system was implemented, 27 different major projects were being proposed or monitored using the tools. In the same time frame, more than 120 staff members learned to use the system. No other computer application ever grew so quickly to affect such a large proportion of the programs and staff at Aerocorp.

Finding strategic applications

Just knowing about strategic applications does not make them happen. Any organization must invest time and energy to overcome barriers to change. Five barriers must be lowered before an organization can make computer graphics into a strategic resource:

- Management's lack of awareness.
 - Lack of access to high-speed hard copy.
 - The stand-alone/stand-in-line mentality.
 - Reliance on weak software.
 - A laissez-faire attitude on the part of the support staff.
- The organizations highlighted in this article have taken steps to solve each of the five problems.
- For example, in each of the organizations described, one individual in an information services capacity

How to get Third Party Service without the party.



When your system components break down, the last thing you need is a parade of repair people taking over your offices. One for each type of printer. One for each type of terminal. And so on and so on.

But that's exactly what can happen when your system combines a lot of different brands of equipment, each with its own maintenance plan.

Now, there's an alternative to the "party"; an alternative that gives you expert service for your complete

mixed-vendor system from one source: Sperry CUSTOMCARE™ Service.

We're the Third Party Service specialists, with a 35-year record of proven service performance. We deliver total hardware support for all your systems and networks. From micro to mainframe. And everything in between.

Best of all, you get all this at one of the fastest response times in the service industry, thanks to a team of 3500 trained Customer Engineers in

the U.S. alone, strategically located in 200 dispatch centers coast to coast.

To find out more about how Sperry can give you a service program designed to meet your needs and budget, send for your FREE Information Kit, "How To Get Third Party Service Without The Party." Simply mail the coupon below or call toll-free 1-800-524-1459, ext. 01. (In NJ, 1-800-624-2107, ext. 01.)

Sperry CUSTOMCARE Service. We promise never to turn your service calls into a surprise party.

Sperry CUSTOMCARE Service



FREE
Information Kit.
"How To Get Third Party
Service Without The Party."

Mail this coupon today or call our computerized operator toll-free at 1-800-524-1459, ext. 01 (In New Jersey, 1-800-624-2107, ext. 01)

☐ YES! I want to learn more about how to get Third Party Service without the party for my computer system needs. Please send my FREE Information Kit.

NAME _____

TITLE _____ COMPANY _____

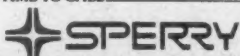
ADDRESS _____

CITY _____ STATE _____ ZIP _____

TELEPHONE () _____ BEST TIME TO CALL _____

MAIL TO: Sperry CUSTOMCARE Service,
P.O. Box 1036, Lansdale, PA 19446-9998

CW 446



Now is the time to make your move.



Concurrent Computer Corporation is confident that the future of computing lies in parallel processing technology.

And we think it's only a matter of time before you come to the same conclusion. There is a steadily increasing demand for number crunching power and newer, more sophisticated applications in real-time and real-time transaction processing. Today, every computer installation experiencing growth can take advantage of parallel processing.

But timing is crucial. The sooner you make the move to parallel processing, the sooner you'll reap the benefits. Wait until later, and the high cost of conversion may cause you some regrets.

There's one company that can take you into tomorrow with a powerful parallel processing solution today. Concurrent Computer Corporation. With proven technology. Available product. And solid support.

So follow our lead and break away from the pack. Sooner or later you'll be using a parallel processing solution. And sooner is clearly better.

To get the full story, mail the coupon. Or call toll-free: 1-800-631-2154.

**Concurrent
Computer Corporation**



I want to lead the pack with Parallel Processing.

Name

Title

Company

Address

City State Zip

Phone ()

Mail to: Concurrent Computer Corporation,
Two Crescent Place, Cresskill,
New Jersey 07637

Pictured above is Ron O'Reilly, current world record holder in the flying 500 Meter and flying 1000 Meter sprints.

In Depth/Million-Dollar Graphics

identified the fact that visual information systems could be of some potential value. That individual then took it upon himself to develop samples and show the capabilities of visual information systems to members of management on whose shoulders fell the responsibility for day-to-day operations in the organization. These managers then identified the potential applications that led to multimillion-dollar impact.

Stated differently, these organizations depended heavily on the direct participation of management personnel outside of the information services area. In general, they were not already computer users. To the contrary, for several managers who assisted in identifying strategic applications, their visual information systems were the first major comput-

er applications with which they were ever personally involved.

These successful organizations used two methods of informing managers about these technologies: group briefings and personal briefings. The group briefings brought together dozens of managers to learn about applications of computer graphics that were used successfully

in other organizations. At the end of the briefing, usually one or more of the managers came forward with suggestions of important business problems that could be addressed using these computer graphics tools.

Alternatively, the information systems proponent of computer graphics would visit individual managers and show them examples of

Most managers are not interested in learning how the technology works, what its future direction will be, how it affects the computers' operations or any of the other details that tend to fascinate the technologist. What managers are looking for is what the technology will do for them.

important applications. In many cases, these visits led to pilot projects that implemented computer graphics solutions to marketing, finance, quality control, engineering, project management or other key areas of management.

Common to both of these methods, and, in fact, essential to all management awareness programs in technology, was the use of case studies. Most managers are not interested in learning how the technology works, what its future direction will be, how it affects the computers' operations or any of the other details that tend to fascinate the technologist. What managers are looking for is what the technology will do for them.

The only effective method known for communicating the answer to that question is to present examples that are relevant to the problems that those managers are trying to solve.

Accessible graphics hard copy

Requirements for high-payoff applications from graphics generally exceed the capabilities of the low-cost plotters that are so common in offices today. Dozens or hundreds of charts are required with very short deadlines. Digital plotters requiring operators to feed paper become barriers to high-volume graphics applications. Busy managers do not have time to baby-sit plotters.

Organizations that use high-payoff graphics applications have discovered that their graphics hard-copy equipment must be a shared resource on the network consisting of relatively higher priced, higher speed, operator-free machines. Even those using digital plotters have purchased automatic paper-feed plotters and connected them to the network, so that the computer can run the plotter continuously, even at the same time that development or previewing of new charts is proceeding. If the plotter were tying up the graphics workstation, simultaneous development and production would be impossible.

Several of the successful organizations are moving beyond the digital plotter to high-speed laser printers. A laser printer, serving as a networked graphics device, changes the body of potential users for computer graphics. Since the laser printer is the same printer that can produce standard listings and typewritten or typeset text, it is not considered a technological curiosity. Rather, end users consider it a standard business tool. By converting the laser printer into a graphics system, the organization makes graphics into a standard business tool.

Where high-speed laser printers are available on a mainframe or minicomputer, volume production of charts is no longer so burdensome. Users feel free to suggest applications that require hundreds or thousands of charts. Such suggestions would have been met with derision in the prelaser days.

Stand-alone/stand-in-line

A common tendency with computer graphics is to put graphics capabilities in an information center and then invite any person who wants to use the tool to come in and borrow the graphics workstation and the graphics hard-copy equipment. Busy executives do not find that a very enticing offer. "What happens,"

"Did I check the competition before I bought IBM? Well..."

Discover Tandy® Computers before it's too late.

Even a quick glance at the personal computer market will prove Tandy to be the clear-cut choice.

We make MS-DOS®-based computers that run the same popular software and support the same hardware as the industry standard... but they cost much less.

Tandy is also unmatched in service and support. We offer affordable on-site and carry-in service contracts. A variety of training courses are available, as well as on-site instruction. An army of trained support specialists are on hand to assist you. Of course, we offer commercial leasing, too.

Remember before you buy: Tandy... Clearly Superior™.

Available at over 1200 Radio Shack Computer Centers and at participating Radio Shack stores and dealers.

Radio Shack
COMPUTER CENTERS

A DIVISION OF TANDY CORPORATION

Send me a Tandy 3000 brochure.

Radio Shack, Dept. 86-A-878
300 One Tandy Center, Fort Worth, TX 76102

Name _____
Company _____
Address _____
City _____
State _____ ZIP _____
Phone _____



Compare the Tandy 3000 with an IBM PC/AT

Feature Description	Tandy 3000	IBM PC/AT
Clock Speed	8 MHz	6 MHz
Standard Memory	512K	256K
Maximum Memory	12 Meg	8 Meg
Serial Port	Included	Option
Card Slots	10	8
Price	\$2390	\$3905*

*Based on IBM price list, November 1985. Tandy 3000 price applies at Radio Shack Computer Centers and participating stores and dealers (monitor, adapter and MS-DOS not included). IBM/Registered TM International Business Machines Corp. MS-DOS/Registered TM Microsoft Corp.

In Depth/Million-Dollar Graphics

they ask, "when two or three managers all need presentations done at the same time?" Even worse, what happens if the equipment is down?

The graphics facilities in information centers today consist mainly of either personal computers with small digital plotters or graphics CRTs with a plotter or a matrix printer attached. Both of these facilities reinforce the idea that computer graphics is a personal tool and should not be relied upon as a production-oriented resource for repetitive, high-volume applications.

How can we expect managers to perceive the technology as useful when it is delivered in a package that appears slow, cumbersome, unavailable and unreliable? The common response is that end users who have high-volume needs can buy their own graphics hardware and software. This response just establishes a new barrier. Now potential high-value users must prove that their applications will be so valuable as to justify \$10,000 to \$30,000 worth of equipment before they can ever prototype it.

In the organizations mentioned, computer graphics was delivered as a corporate resource, not as a stand-alone technology. Potential users could try out the technology at their own desks using shared graphics hard-copy devices and any terminal connected to the mainframe computer. No new user had to buy equipment before developing a prototype application.

As you can see, the solution to this problem is highly dependent upon making graphics hard-copy equipment into a shared resource. But, in addition, the graphics software was delivered on shared high-powered computers so that individual users could get access to it without having to go through long software or hardware acquisition cycles or stand in line waiting for a workstation to become available.

Buying the best

"Graphics software differs greatly in its quality. It pays to get the best in order to sell the information center capabilities to senior management." With these words, James Martin, America's data processing guru, summed up his solution to the paradox of graphics software in his book, *Application Development Without Programmers* (The Telecom Library, New York, 1982). The paradox arises because graphics is one of the simplest computer applications, and yet users rarely are satisfied with their graphics capabilities.

In other words, there is a very short "mean time to anger" before a user of a high-payoff computer graphics application becomes frustrated with graphics software capabilities that seemed so rich only a few days or weeks earlier.

All demand for graphics seems to be cumulative. The chart that is requested on Day Two is the one that was requested on Day One, plus "just a few changes." The changes mount up, especially in high-payoff applications, until a single page may have five, 10 or 20 changes. Each chart may have bars and lines and text and tables on it. Special graphical symbology and logos may have to be added. And all of it has to be designed for reading by people whose eyesight is not as good as it was when they were 18 years old.

The fundamental requirements for

graphics software for high-payoff applications consist of the following:

The ability to say "Yes" every time a request is made for changes, combined with the power to produce the revised charts automatically once the design changes have been put in. In other words, the system must be able to create whatever chart is requested and then to make chart production a hands-free operation. The software should be able to produce a hundred charts automatically in the time that an operator could design a single chart.

Quality at least equal to the best that the manual graphics arts department produces. Anything less risks embarrassing the people who use the visual information and those who produce it.

Automatic access to data so that the information does not have to be

typed in. Data access for high-payoff applications generally requires more than traditional fourth-generation languages. The access methods must include facilities for reading files and reports generated by other application programs.

Chart book library systems that maintain the designs on-line so that new users do not have to reinvent charts; they can use charts already designed by expert users or by graphics designers.

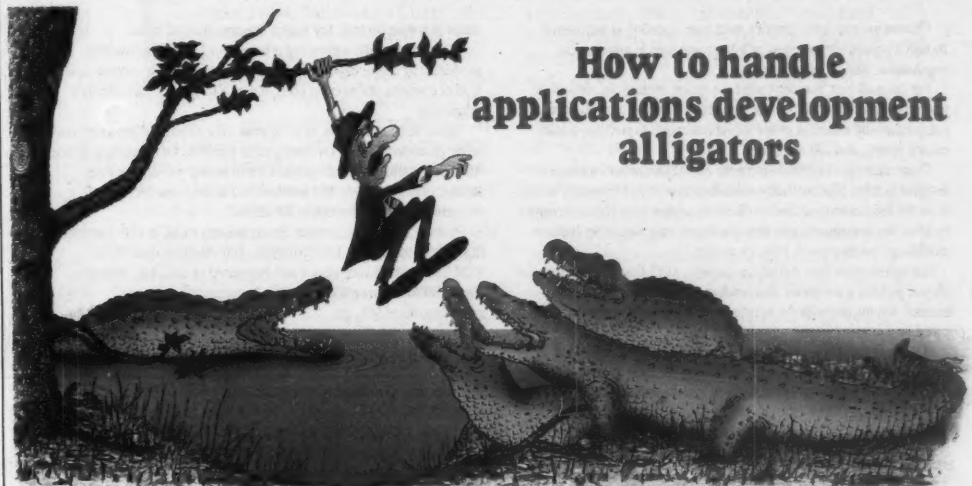
Intelligence to assist users with complex tasks that would be too time consuming or would reduce the value of the charts. Examples include the following: automated conversion from colors to black and white when monochrome handouts are needed; automated reduction algorithms that make charts small enough to put multiple charts on a page but that

increase the size of the lettering so it remains readable even on the small charts; and features such as automatic color selection so that users do not have to become color experts.

Project management graphics with predefined charts for project scheduling, critical-path methods, staff requirements and cost analysis. These charts have to be predefined because their complexity is sufficient to deter potential users who would be forced to design their own.

Instant on-line delivery systems for executive access to up-to-date charts of key management indicators.

These requirements might best be considered a hierarchy of needs. As each requirement is met, the need to meet the next one becomes essential. At first, new users of computer graphics ask for simple bar and line



How to handle applications development alligators

Our special seminar shows you how

You may have heard some form of the saying, "When you're over to your gluteus maximus in alligators, it's hard to remember you started out to drain the swamp."

If that's beginning to sound uncomfortably like your job description, and you're responsible for applications development, we have something to help: The CGI special seminar, "Managing the Full Life Cycle for Application Productivity."

You'll learn a comprehensive way to snatch your applications development operations from the jaws of paralysis. It's PACBASE™, CGI's unique dictionary-driven software system that can swiftly streamline your applications development and dramatically cut maintenance costs. By managing your full life cycle PACBASE™ will pay you dividends of greatly increased productivity and better control of your company's

corporate data and related processes. And you'll hear how over 450 companies world wide have benefited from this system.

"Managing the Full Life Cycle" is specifically designed for vp's/directors of MIS and managers of applications development. The sessions last half a day, and they're FREE. Naturally, space is limited. To be sure of a reservation, why not take a moment to fill out and send in the coupon now? (For even faster service, call Linda Rose, Seminar Manager at (914) 735-5030 collect.)



CGI Systems, Inc.
One Blue Hill Plaza, P.O. Box 1645
Pearl River, NY 10965

1986 SPRING SEMINAR PROGRAM

5/6/86	Hartford	Hartford Marriott Farmington
5/7/86	Boston	Boston Marriott-Copley Place
5/8/86	New York	The Westbury
5/8/86	Orlando	Orlando Marriott
5/9/86	New Jersey	Saddle Brook Marriott
5/13/86	Los Angeles	The Westin Bonaventure
5/14/86	San Diego	Hotel Inter-Continental San Diego
5/15/86	San Francisco	Hyatt on Union Square
5/16/86	Seattle	Hyatt Seattle at Seattle-Tacoma International Airport
5/21/86	Oak Brook	Hyatt Oak Brook
5/22/86	St. Paul	The Saint Paul Hotel
5/23/86	Dearborn	Hyatt Regency Dearborn at Fairlane Town Center
5/28/86	Chicago	Hyatt Regency in Illinois Center
5/28/86	Dallas	Loews Anatole Dallas
5/29/86	Salt Lake City	The Westin Hotel Utah
5/29/86	Denver	Sheraton Denver Airport
6/3/86	Arlington	Twin Bridges Marriott
6/4/86	Baltimore	Sheraton Inner Harbor Hotel
6/5/86	Atlanta	Hyatt Regency in Peachtree Center
6/10/86	Columbus	Hyatt Regency Columbus at Ohio Center
6/11/86	Indianapolis	Hyatt Regency at State Capitol
6/12/86	Philadelphia	Hilton of Philadelphia
6/13/86	Milwaukee	The Marc Plaza Hotel

Help me get the alligators off my back.

☐ I and _____ of my associates would like to attend the _____ seminar in _____ (number) (date) (location)

☐ I cannot attend but would like more information.

Name _____

Title _____

Company _____

Street _____

City _____ State _____ Zip _____

Phone _____

In Depth/Million-Dollar Graphics

charts. A week or two later, they are trying to combine bars and lines on the same graph, put numbers inside each of the bars or put tables at the bottom of the charts. If their software allows them to make their charts more complex, then they get a request from management for several sets of those charts every week or every month.

Suddenly it is no good to have a system that allows them to draw the chart with a mouse on the computer. They do not have the time to do that every week. Further, as the number of charts grows, data entry begins to take up time and to create new errors. At that moment, the requirement for automatic data access rises to prominence.

This process of uncovering new requirements continues until the strategic application is fully imple-

mented and has been working for several months or a year.

This common scenario of problem/solution/new problem is the underlying justification for Martin's admonition that it pays to get the best.

When you skimp on the software side, labor has to be substituted for software. With tight deadlines, high-volume requirements and high visibility of strategic applications, sub-

stituting labor for software is a recipe for disaster.

Effective support

One visible characteristic that separates the organizations with strategic applications from those without them is the visual information system proponent that is always found in the successful organizations. Here, one or two people have

taken on the job of making graphics successful. These people recognize that the vendors' claims of ease of use are accurate only when end users have someone to turn to for help over the initial hurdles.

Far from adopting a laissez-faire attitude, the visual information system proponent runs training programs, provides help in linking to data, maintains chart libraries and is available to provide a helping hand to end users in need.

The need for a person with such a high degree of commitment to visual information systems graphics brings us full circle in the five requirements. Unless management is aware of strategic applications, it will consider computer graphics to be a new toy rather than an important tool. Without clear justification, information systems managers will not supply the hardware or software, or they may not assign sufficient staff to provide good support.

Thus, the first step is to develop end-user managers' awareness of the value of visual information systems. Once they perceive the application, they will help justify the cost of doing the job right. The question will change from "Are we an organization that needs high-payoff graphics?" to "Which of our applications could benefit from high-payoff graphics?"

Excellence in the 1980s

How a company uses charts and who in the organization produces them determine success more than what kind of company it is. The best chart-producing teams consist of partnerships between managers inside and outside information systems departments.

Overall, the most consistent error in implementing graphics systems for senior management stems from new users trying to replicate their standard printouts — just converting them to a visual format. By contrast, the most successful chart books show data beyond the standard printed reports, data that may never have appeared in weekly printouts or at least was not pinpointed in the same way.

The lesson is this: Do not bury key indicators in the midst of useless indicators. Instead, orient chart books toward specific goals that management aims at already (see chart page 70). The measure of a worthwhile chart lies in whether or not management actions will result from it — whether decisions will be made on the basis of it. Charts do not yield as high a payoff if used for reference only.

Excellence in information systems during the second half of the 1980s will be measured in large part by the impact of information systems on the success of the business — in other words, on strategic and competitive applications for information systems.

Computer graphics stands at a crossroads: It can either be supported as a personal tool for personal presentations or as a strategic resource. The successful organizations identified in this article have all discovered that the strongest approach supports both aspects of computer graphics: offering personal graphics for personal applications while, at the same time, meeting the five requirements that make visual information systems feasible and valuable in their organizations. ■

When you skimp on the software side, labor has to be substituted for software. With tight deadlines, high-volume requirements and high visibility of strategic applications, substituting labor for software is a recipe for disaster.

Chances are you don't currently audit your operating system—even though it's ultimately in control of information used to manage your organization. And for good reason.

For the most part, you don't audit the system because the software is just too complex. Then too, certain hard data on system controls is usually unavailable. And a manual review would take weeks to perform, require outside experts, and cost too much.

Those are some of the main problems AEX2-Examine/MVS software is designed to solve. This new software package now makes it possible for you to get the information you need to effectively analyze your MVS environment. So when top management asks how you know your data center business controls are working, you'll have the answer.

Through its more than 100 on-line displays, AEX2-Examine/MVS software lets you perform a completely independent audit, right from your own terminal. You interact with the software in a conversational mode, guided by a series of menus.

AEX2-Examine/MVS software gives you a more complete, up-to-date picture of your total operating environment—in real-time. Instead of waiting hours to get a report on system status, you can immediately check the

status of system controls, key system libraries, files and tables.

AEX2-Examine/MVS software also helps your DP staff become more productive by improving their knowledge of the system, its controls, and its level of operating efficiency. In effect, it puts MVS under a cost-conscious microscope.

Tighter business controls, more accurate information and improved data center productivity are all key management objectives for the coming decade. AEX2-Examine/MVS software provides a tool to help you achieve these strategic objectives today. And positions you to meet your increasingly stringent demand for due care in the future.

For more information, contact Shawn McLaren today, at 1333 Lawrence Expressway, Santa Clara, CA 95051-3595; (415) 941-4558; Telex 357437.

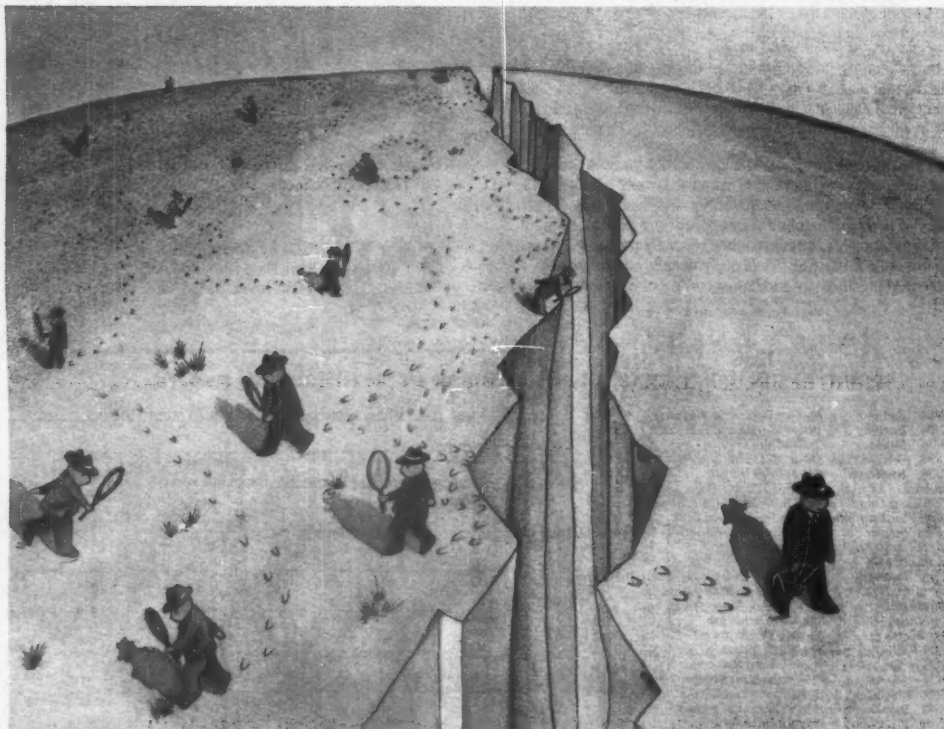
AEX2-Examine/MVS is developed and maintained by SKK, Inc., Rosemont, Illinois. ■ AEX2-Examine/MVS and AEX2-Examine/MVS are trademarks of SKK, Inc.

The Cambridge Systems Group

Over a decade of strategic software solutions.



AEX2-Examine/MVS auditing software. Your bridge to the future.



In Depth

System/38 grows up

By DAVID ANDREWS
and FREDERICK MANTEGHIAN

In June 1984, Sealectro Corp. in Trumbull, Conn., decided to replace its IBM 4341 Model 2 computer with an IBM System/38. In less than a year, all of Sealectro's systems were replaced with improved applications, and a number of new ones were implemented as well. All of the new applications were interactive and used a relational data base.

The computer staff shrank from 20 to eight, with the programming staff dropping from 10 to three, yet the smaller staffs were able to accomplish significantly more work. The number of on-line terminals increased from 50 to 75, but the total cost of data processing fell by more than 20%.

Jeff Hosking, Sealectro's vice-president of finance, managed the replacement project. Hosking says, "The System/38 has given us more capability for less cost with a much smaller staff, and we still haven't exploited its full capabilities."

Sealectro is not the only company that discovered the System/38. Giant computer users like General Motors Corp. and Union Carbide Corp. have made extensive use of the System/38 for several years.

In spite of numerous success stories, the impact of the System/38 on the U.S. computer market has been limited in the six years since deliveries began. It appears, however, that the System/38 is finally ready to take off.

While IBM is secretive about its marketing strategy, the System/38 seems to be getting the marketing attention its technical track record has earned. IBM marketing management began to notice that System/38 users are among IBM's happiest customers. In addition, the System/38 is one of IBM's strongest products in Europe and Japan.

Management noticed that it was easier to sell and support a System/38 than a comparable 4300 series system and that installed System/38s generate add-on sales for disk storage, proces-

sor upgrades, memory, terminals and maintenance with little sales effort.

As a result, IBM recently designated the System/38 a "strategic" product and directed its sales force to make a greater effort to sell System/38s. IBM will soon announce a number of dramatic enhancements for this system, including larger processors, more disk storage, increased main memory, a new low-end model and the ability to run the System/36 SSP operating system and programs.

Why has the System/38 taken so long to gain serious recognition? Three factors slowed its acceptance in the U.S.:

- The product got off to a bad start.
- It has been the victim of internal IBM politics and organizational changes.
- The System/38's unique architecture makes the machine hard for potential users and IBM's own sales force to understand.

Limiting factors

The history of the System/38 shows how these factors worked to limit its initial success.

In the early 1970s, IBM started to work on a replacement for its newly developed 370 series. Two project teams were put to work on the design. The team that was given the assignment of developing a better 370 came up with the 3030 series and the 4300 series. The other team was told to develop an ultimate computer architecture or "future system."

In the mid '70s, an internal study showed IBM management that 370 users would not tolerate a conversion to a new architecture, and the future systems team was broken up.

The more than 1,000 future systems team members were reassigned to a variety of locations, but a number of them went to the General Systems Division, where a similar group was developing a new computer architecture.

IBM created the General Systems Division to counter the threat posed by the minicomputer companies and to hedge against an unfavorable antitrust judgment. The General Systems Division developed and sold smaller computers such as the System/3, System/34 and Series/1. The division operated through its own network of sales offices that competed directly with



PHOTO BY P. CHARLES LADOUCEUR

By all reports, System/38 users are among IBM's happiest customers. Once the victim of internal politics, System/38 — with its enhanced architecture — is strategically positioned as IBM's mid-range computer for the future.

Andrews is president of Andrews, Duerr and Manteghian, Inc. (ADM), a computer consulting firm in Cheshire, Conn. Manteghian is vice-president and cofounder of ADM.

In Depth/System/38

divisions of IBM were organizing and reorganizing themselves, their counterparts in the rest of the world were out selling System/38s at a surprising rate. More than 60% of the 18,000 System/38s sold to date are installed outside of the U.S.

In 1985, for example, about 900 System/38s were sold in Japan vs. approximately 1,100 in the U.S. Since the Japanese computer market is smaller than the U.S. market and since IBM's overall market share is smaller, System/38 sales clearly represent a large part of IBM's total Japanese sales.

Why are the Japanese buying so many System/38s? The advanced architecture, the high productivity of System/38 programmers and the ease of use appear to appeal to Japanese computer buyers.

What is it that makes IBM's "future system" computer so unique? First, the System/38 architecture is closed, meaning IBM does not publish detailed technical specifications on how it works. As a result, there are no plug-compatible System/38 computers on the market and no third-party operating system products available.

There are several other unique concepts behind the System/38 design:

Integrated system software. The operating system does all of the functions performed by a variety of separate products on mainframes. To get comparable functionality on a 4300, a user would need VM/CMS, DOS/VSE, CICS, SQL and a variety of other products.

Single-level storage. The System/38 user sees a single large, virtual memory space for all programs and data.

Integrated relational data base management. The relational data base management function is an integral part of the operating system. It operates very efficiently because the operating system and hardware were designed with the relational data base in mind.

Friendly control language. The System/38 control language is both simple to use and very powerful. A System/38 environment does not require system programmers.

Programming productivity. The RPG-III programming language, combined with a variety of powerful utility programs and operating system commands, makes the System/38 extremely easy to program. Our own experience is that a programmer is three to five times more productive on a System/38 than on a 4300 with Cobol, CICS or a traditional data base management system.

Interactive orientation. The System/38 hardware divides the tasks involved in supporting interactive processing among a number of specialized processors within the system, allowing it to handle a heavy interactive load efficiently.

Field upgrade. Any System/38 model can be field upgraded to any larger model.

Large addressable space. The System/38 design allows it to address uniquely more than 18 trillion gigabytes of storage.

Networking capabilities. The System/38 can act as a host in an IBM Systems Network Architecture network, supports a variety of protocols including X.25 and can be loosely coupled for multiprocessing. When a System/38 is networked with a mainframe, terminals on either com-

puter can access applications on the other.

Writing applications

The particular features of the System/38 make it easier to program than more traditional computers, especially interactive data base-oriented applications. As a result, System/38 shops tend to have small programming staffs and no systems programmers. Since applications packages can also be written quickly, the time required to develop and implement an application is often much shorter than on a mainframe using traditional programming techniques. System/38 packages tend to cost less than half of what a package of similar capability would cost on a mainframe.

While applications written for other computers in Cobol, PL/I, Basic

or RPG-II can be converted to run on a System/38 with the help of various conversion programs, most System/38 sites end up either implementing packages written specifically for the System/38 or rewriting the applications themselves in order to take advantage of the System/38's particular capabilities.

Much of the large body of available software for 370 mainframes is thus not readily available to the System/38 user.

The System/38 has other limitations. It offers no hardware floating-point capability or Fortran compiler, making it uncompetitive as a scientific or engineering processor. There is no available assembly language or ability to alter the operating system, limiting its use for highly specialized applications such as process control.

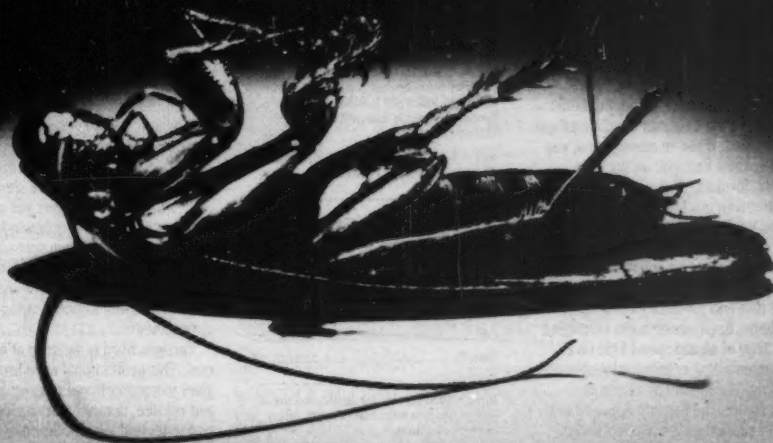
The largest configuration avail-

able is powerful by mini standards but still amounts to no threat to replace large-scale mainframes. The top-end Model 40 can support 256 local terminals plus numerous remote devices on up to 12 communications lines. Its main memory goes up to 16M bytes. Up to 6.6G bytes of disk storage can be attached.

Upgrades to the System/38 hardware and software have surfaced every nine to 12 months since its introduction. According to reliable IBM sources, within a few months, a new top-end System/38 will be announced that will double disk, memory and processing power.

For years there has been speculation that IBM might drop the System/38 because it complicates IBM's already confusing collection of computer architectures and because it competes directly with the 4300

BRING BUGS TO LIGHT



WITH REALIATM COBOL ON A PC

The fastest micro COBOL.
The brightest interactive source debugger.
IBM mainframe COBOL compatibility.
Superb support.
Try it for free, if you qualify.

10 South Riverside Plaza
Chicago, IL 60606
Phone: 312/346-0642
Telex: 332979

**REALIA
inc.**

In Depth/System/38

series. Furthermore, relatively few computer professionals have any experience with the system.

Conversely, some experts have speculated that the System/38 might form the basis for a future generation of top-end mainframes since the architecture can easily handle expansion.

We believe that both of these theories are wrong. Based on information from sources close to IBM's Rochester, Minn., laboratories, IBM's strategy is to position the System/38 as its main mid-range computer.

This will be accomplished by enhancing the System/38 dramatically over the next two years, then replacing both the System/38 and the System/36 with a new computer. This new machine will not be a field upgrade of the existing System/38, but it will retain the System/38 architecture

and the CPF operating system.

The first step toward this new machine will be taken later this year when it will become possible to run SSP, the System/36 operating system, on System/38s. At the same time, IBM will announce a new low-end version of the System/38.

These moves will accomplish a number of objectives: System/36 users running out of capacity will have

an easy upgrade path, System/38 users will have access to the large library of System/36 applications and the remaining System/34 and System/3 users will be strongly motivated to go directly to the System/38.

Fate of 4300 users

If the System/38 becomes IBM's preferred mid-range system, then what will happen to the 4300 series?

We believe that IBM will continue to push larger 4300 series users toward MVS and that support for DOS/VSE will fade in the next few years. Those users that do not want to move up to MVS will be encouraged to switch to the System/38.

Meanwhile, IBM will continue to offer non-water-cooled 370 processors like the 4381 for many years to come, and the company will attempt to control production costs by using as many common components as possible for the 4300 and System/38 product lines. IBM already started moving in this direction by offering common terminals and other devices for the two product lines.

During the next two years, the System/38 will see a number of important enhancements, including the following:

- Larger processors with more memory.
- New disks and a dramatic increase in total disk capacity.
- More communications lines and higher speed lines.
- A low-priced, entry-level model.
- Enhanced engineering/scientific capabilities.
- New terminals and support of ASCII terminals.
- Enhanced multiprocessing capability.
- Dramatically reduced recovery times.
- Improved communications capabilities, especially with X.25 nets and IBM's Token-Ring network.
- More office automation software and features.

The original role for the System/38 was to replace the System/3, to provide an upgrade path for System/34 users and to help counter the threat from competitive minicomputers. As IBM positions the System/38 as its strategic mid-range system, it will be both a general-purpose computer for smaller organizations and a specialized system for large users.

The roles the System/38 will play in larger companies include the following:

Distributed processing. The System/38 makes sense where complex applications are needed but a large local staff is impractical.

Office automation. As the System/36 and System/38 product lines merge, the System/38 will become the focal point of IBM's future office automation offerings.

Departmental systems. The programming productivity of the System/38 makes it attractive as a system dedicated to the unique needs of a single department.

Personal Computer control. The System/38 will increasingly be used as a file server and network controller for a group of Personal Computers.

The new sales organization in the U.S., the 1986 commission structure and the new products and capabilities that will be announced later this year should all lead to greater System/38 sales — slowly, since IBM's mainframe-oriented sales force still has a great deal to learn about the System/38.

After a rocky start, the System/38 has matured into a powerful product for IBM. It is here to stay, not as a replacement for mainframes but as a powerful general-purpose computer for smaller organizations and as an alternative for distributed processing, departmental systems, office automation and PC control in large organizations.

LOTUS 1-2-3.[®] FARSIGHT.

WHY THEY'RE ALIKE.

For starters, the Farsight Spreadsheet works like a clone copy of Lotus version 1A, the one over a million people already use. If you're among them, you already know Farsight: all the commands, formats, all the keyboard- and menu-driven macros.

You don't have to re-learn a thing. Your existing 1-2-3 files, macros and templates will never know the difference, either—so your investment in 1-2-3 data and procedures is secure. But Lotus itself wants you to surrender your copy of 1A and spend \$150 on a new release that requires a lot of re-training. Thanks, but no thanks.

Compare: the Farsight Spreadsheet is fully supported by the people who created it. And Farsight gives you some amazing high-voltage features to work with.

IBM is a registered trademark of International Business Machines Corporation. 1-2-3 is a registered trademark of Lotus Development Corporation.

Hardware requirements: IBM PC family or 100% compatible, dual-floppy or hard disk, PC-DOS 2.0 or higher.

YES, rush me _____ copies of Farsight, non-copy protected and money-back guaranteed for 30 days. Enclosed is \$99.95 plus \$7.00 shipping and handling per copy. In Texas, add \$6.13 sales tax. U.S. prices only.

☐ Check ☐ Money Order
☐ AMEX ☐ VISA ☐ MASTERCARD

Credit Card # _____

Expiration Date _____

Signature _____

Name _____

Shipping Address _____

City _____

State/Zip _____

Day Phone _____

International orders add \$30 shipping/handling. If paying by check or draft, must be in U.S. dollars drawn on a U.S. bank.

INTERFACE TECHNOLOGIES CORPORATION

3336 Richmond, Suite 200, Houston, TX 77098

(713) 523-8422

WHY THEY'RE DIFFERENT.

Farsight frees you from the hassles of copy protection. It costs \$99.95, which isn't cheap; rather, at \$495 Lotus and others are almost criminally overpriced. \$99.95 is exactly what high quality, feature-loaded software should cost.

Features! Farsight gives you pop-down menus. And multiple windows: now you can work on two spreadsheets at the same time—and handle your disk file management chores and word processing without leaving the spreadsheet.

Farsight Word is included at no extra cost. This professional word processor gives you proportional spacing, search and replace, decimal tabs, multiple typesets and lots of other convenience features found in the most expensive word processors.

Everything's integrated, too: use Farsight windows to "paste" spreadsheet results directly into your letters and reports.

One other thing: you get a 30-day money back guarantee. So you can't lose. Order Farsight; do it now. You'll get everything you love about Lotus. And that's just for starters.

ONLY \$99.95

FARSIGHT
A bright new look at Lotus.

from Interface Technologies Corp.
3336 Richmond, Suite 200, Houston, TX 77098

1-800-922-9049

(In Texas, call 713/523-8422) Telex: 322127
In Europe, call ITC in Switzerland at (01) 706-3037

At 19,200 bps, speed alone can be blinding.

In the race to claim the fastest high speed modem, many modem companies advocate basing your buying decision on one thing: speed. What's happened, unfortunately, is that modem purchasers are getting so caught up in modem speed they're losing sight of the most important consideration.

Modem performance. So before you rush into a high speed modem, ask yourself two simple questions. What level of performance do you really want out of a modem which operates at 19,200 bps? How much more efficient will it make you?

The answers to these two questions will lead you to one modem.

Introducing the Codex 2680.

It's the thoroughbred of 19.2 kbps modems. The superior performance of the Codex 2680 is achieved by utilizing enhanced 64-state 8-dimensional Trellis Coded Modulation (64 x 8 TCM), enabling Codex to position error-correcting data in a smaller signal constellation, thereby making it less susceptible to line disturbances.

In actual use the Codex 2680 delivers 99.9% error free data over more than 90% of standard 3002 D1 conditioned lines at 19.2 kbps.

The big payoff.

Speeds of 19.2 kbps allow you to realize dramatic increases in efficiency and productivity. Without increasing expenses or staff resources. And these savings add up. Fast. With its standard 2-channel multiplexer, you can eliminate extra lines. For example, by combining two separate 9600 bps circuits into one leased-line at 19,200 bps typical savings for a New York to LA link are greater than \$24,000 per year.*

What's more, the Codex 2680 offers complete network management capabilities for monitoring and fault isolation. It can operate independently or with your central site Codex network management system, to ensure greater network availability. In short, it's a modem that's really a true network system resource.

It's all perfectly clear.

Another important feature of the Codex 2680 is the fact that it is shipping right now. Not tomorrow. Now.

If you still have questions or would like a product demonstration, simply call 1-800-426-1212, ext. 227.

Or write Codex Corporation,
Dept. 707-227,
20 Cabot Blvd.,
Mansfield, MA
02048.



*The new Codex 2680 19200 bps
high speed modem.*

The quicker you do it, the faster you'll be achieving what you really want out of a high speed modem. Performance.

codex
 **MOTOROLA**

*Based on average installation and leasing charges for 3002 D1 circuits as of 10/85.
Motorola and @ are trademarks of Motorola Inc.
© 1985 Codex Corporation. Codex is a registered trademark of Codex Corporation.

"What if... YOU HAD



MORE RAW HORSEPOWER?"

INTRODUCING THE HP 3000 SERIES 930 SUPERMINI.

The new HP 3000 Series 930 is a new breed of business computer. While it's a full member of the HP 3000 family, it has more brute power and performance than any HP 3000 we've ever built. It's designed around a new breakthrough architecture. But most importantly, it's the latest example of Hewlett-Packard's commitment to providing solutions for the long run.

4.5 MIPS AND QUITE A BIT MORE THAN 32 BITS.

The HP 3000 Series 930 gives new meaning to the term "supermini."

Now you can have a 4.5 MIPS computer that can address a space 64,000 times larger than a typical 32-bit machine. A computer that can handle hundreds of on-line users and large batch processing jobs at the same time. In fact, you can link Series 930 systems to create a network for thousands of users.

And with enough power to support a division of a large corporation, the Series 930 is on a performance level with the IBM 4381-12 mainframe. That means you get mainframe-class performance and the ease-of-use of a minicomputer. At a minicomputer price.

HEWLETT-PACKARD'S NEW PRECISION ARCHITECTURE.

The performance of the HP 3000 Series 930 is achieved through a synergistic use of an enhanced operating system, a new database management sys-



tem and a new architecture that we call Precision Architecture.

HP Precision Architecture is a fully engineered architecture, based on extensive measurements to evaluate the utility of each feature. We also wanted to keep it simple. The result is a design that exploits the CPU price/performance advantages of R.I.S.C. (Reduced Instruction Set Computing), while adding an unprecedented level of execution balance. A balance that maximizes throughput and effi-

ciency while maintaining compatibility with our current products. In fact, the performance levels have been so dramatic that a new generation of HP computers is being built around HP Precision Architecture.

THE LONG RUN.

Since the HP 3000 Series 930 is part of a family, it's compatible with existing HP 3000's. And HP Precision Architecture assures compatibility with the new, more powerful HP computers to come. Because we don't believe in temporary solutions.

We believe in solutions that help your company for the long run. And that takes

more than hardware and software. It takes ideas. Ideas that have given us a worldwide reputation for quality products. And the quality service and support to match.


So at Hewlett-Packard, we never stop thinking, questioning, probing. We're always asking... "What if...?"

If this sounds like the solution you've been looking for, call 1 800 345-6366, Dept. 282G for more information.



**HEWLETT
PACKARD**

Business Computing Systems



*"If we're going to
plug a hard disk into
everyone's PC, we
should max out the
RAM, too."*



*Turn your PCs into serious machines.
With FileCard.™ It gives you a 10MB
hard disk and an on-board option of
up to 512K extra system RAM. Low,
low power means you don't have to
upgrade power supplies, either.*

WESTERN DIGITAL
ENHANCED PERIPHERALS

Western Digital Corporation, Enhanced Peripherals Division
2445 McCabe Way, Irvine, CA 92714
For the dealer nearest you call 1-800-847-6181.

FileCard is a trademark of Western Digital Corporation.

NEW PRODUCTS

Map-Master tool begins shipping

Decision Resources Co. of Westport, Conn., last month announced and began shipping Map-Master, a \$395 mapping software package for businesses that allows users to create custom maps to use in slide presentations, reports and overheads.

Map-Master permits users to view data by country, state, county or ZIP code or to define their own region. The product can then produce shaded maps geographically displaying corporate sales, demographics and other information.

With Map-Master's Datagrabber feature, information from data bases and spreadsheets can be imported and displayed in map form. Data can also be entered manually.

To create a map, users enter data, and Map-Master converts it into a map, complete with colors or hatching patterns displaying the data according to state or region. Map-Master also adjusts the map as new data is entered. Users can insert or change map features such as symbols, fonts and text. Eight colors are available as are seven fonts, 94 symbols, 16 type sizes, italics and underlining.

In addition, the product is bundled with a library of demographic and statistical information such as income, age, population, retail sales and market potential for 50 states. Other libraries, including boundaries of the U.S. by county, metropolitan area, area of dominant influence, designated market areas and boundaries for the world by country, are available separately for \$95 to \$185.

Map-Master runs on IBM Personal Computers and compatibles with a minimum of 384K bytes of random-access memory and a graphics adapter. For color monitors, the package requires an IBM Professional Graphics Controller, IBM Color Graphics Adapter or Enhanced Graphics Adapter. For monochrome monitors, the package requires a Hercules Computer Technologies Co. card.

Trans-Lux Communicator stars nonvolatile memory

PC able to compute while sending, getting messages

Trans-Lux Corp. of Norwalk, Conn., announced the Trans-Lux PC Communicator, a communications device that turns a personal computer into a telecommunications terminal while allowing the computer to continue running separate programs.

According to a company spokesman, the product allows users to simultaneously compute and send or receive messages.

PC Communicator is based on a Zilog, Inc. Z80 microprocessor, contains AT&T 103 and 212A modems and an V22.BIS 2,400 bit/sec. modem and plugs into an IBM Personal Computer or compatible expansion slot. Because the device includes 128K bytes of nonvolatile memory (expandable to 256K bytes), none of the microcomputer's memory is needed to send, receive or store messages. Users can store up to 99 sent messages and 999 received messages, the firm said.

PC Communicator also has a real-time

clock with battery backup that stamps every message with the date and time and provides message security. An auxiliary RS-232 port can be used to connect PC Communicator to a second printer to print out messages.

A communications program on the plug-in board controls outgoing dialing, incoming answering and all line connection functions including setting bit/sec. rates. Additionally, an on-disk communications program provides Help screens to assist in composing and transmitting messages in the protocols required for certain networks.

Because messages can be composed and then transmitted at predetermined times, users can save money by sending messages on weekends or late evenings when telephone rates are lower, according to the spokesman.

Although PC Communicator will be sold for \$1,395, the product can be leased for \$57 per month for the first year, \$54 per month for the second year and \$51 per month for the third year. Installation and removal of the product, however, is extra.

Pathway line for IBM debuts

Pathway Design, Inc. of Natick, Mass., has announced a micro-to-mainframe product line that is said to allow IBM Personal Computers and compatibles to communicate with IBM System/34, 36 and 38 minicomputers on an IBM Systems Network Architecture (SNA) network.

According to a company spokesman, PCpath 5250 supports four concurrent sessions with the host. It emulates a Pathway 5251 Model 12 with attached displays and printers. It includes all attributes of the standard 5250 device, including support for monochrome and color displays as well as support for the complete set of 5250 commands and special function keys. The product operates on dial-up, leased and

point-to-point lines at speeds up to 9.6K bit/sec.

With PCpath 5250, a user can establish multiple communications sessions with the host, flip between the sessions and maintain communications sessions in the background while initiating a local personal computer application in the foreground, the spokesman said.

Pathway's PCpath 5250 also includes a bidirectional file transfer package for text and binary data. The software, called Decisionlink file transfer software, was developed by Laguna Laboratories, Inc.

Available in June, the PCpath 5250 software, Decisionlink and the Pathway Communications Adapter cost \$750.

Tandem announces Measure

Performance monitor for Nonstop systems

Tandem Computers, Inc. of Cupertino, Calif., has announced Measure, a full-function system performance monitor for use on Nonstop systems.

Measure, a replacement product for Tandem's existing performance measurement product Xray, is said to allow users to collect and examine performance statistics for systems software and hardware components, including CPUs, disk drives, remote systems, communications lines and software components.

Measure was designed for the Tandem multiprocessor environment. It can make up to 64 concurrent measurements. Different users may start and stop measurements concurrent-

ly, interactively or at predesignated times. Measure also contains a capability for collecting application events through user-defined counters.

Measure has fault-tolerant features that automatically restart measurements when processors are restarted. According to the vendor, it is highly integrated with Tandem's Guardian 90 operating system.

Another feature is an open architecture with a programmatic interface that accesses data control functions, so software subsystems can communicate directly with Measure.

For the Nonstop EXT system, the initial license fee is \$1,500 per system, with a monthly license fee of \$100. For the Nonstop II and TXP systems, the initial license fee is \$3,000 per system, with a \$200 monthly fee.

Northern Telecom introduces its Meeting Communications System

Expanding the capabilities of its Meridian DV-1 voice and data system, Northern Telecom, Inc. unveiled a computer teleconferencing system and several workstations.

Northern Telecom's Meeting Communications System (MCS) allows up to 24 DV-1 users on the same local network to participate in a computer teleconference in which they speak to one another and share data. Callers from any outside telephone may also participate but without the data-sharing capability.

In addition, Northern Telecom introduced the Meridian 6000 series of workstations, consisting of the Meridian M6110, an IBM Personal Computer AT clone and the Meridian M6210, a multiuser workstation running Microsoft Corp.'s Xenix that can

support up to five asynchronous AS-CII terminals.

The MCS teleconferencing system utilizes a screen illustration of a conference session. Icons representing the various participants are pictured around a rectangle representing a table or in a grid representing a classroom. Each participant may call up data or text and have it appear on the screens of the other conference participants.

Only two persons may converse at one time, although a third person may cut into the conversation. Voices are picked up by a microphone installed in each terminal.

DV-1 terminals range from \$5,000 to \$8,000. Adding the teleconferencing capability costs approximately an additional \$1,000 per terminal.

INSIDE

Software & Services/88

Microcomputers/89

Communications/103

Systems & Peripherals/105

NEW PRODUCTS/SOFTWARE & SERVICES

SOFTWARE
& SERVICES

Applications packages

Tominy, Inc. has enhanced its Mach 1 multiuser system generation facility said to produce portable application code for more than 20 different micro, mini and mainframe computers.

Enhancements include increased scope of programs generated automatically, ex-

panded programming logic commands, new screen scrolling functions and improved security sign-on procedures. It also includes enhanced editing and early error detection among development utilities.

Pricing for Mach 1 development licenses range from \$2,500 for a microcomputer to \$72,000 for an IBM mainframe. Runtime module licenses range from \$300 to \$4,000.

Tominy, 4221 Malsbary

Road, Cincinnati, Ohio 45242.

Languages

Cadam, Inc. has announced Basicad, a front-end software program to Cadam's Geometry Interface Module.

According to the vendor, Basicad is a Basic-like macro language designed to allow Cadam operators to write, debug and execute macros entirely at the IBM 5080

graphics screen or optionally on a 3270 alphanumeric terminal.

Basicad programs can be stored as Cadam modules so users can move between drawings and macros without leaving the scope, the vendor said.

Basicad operates in batch or interactive mode on both VM and MVS systems.

It costs \$11,500.

Cadam, 1935 N. Buena Vista St., Burbank, Calif. 91504.

Utilities

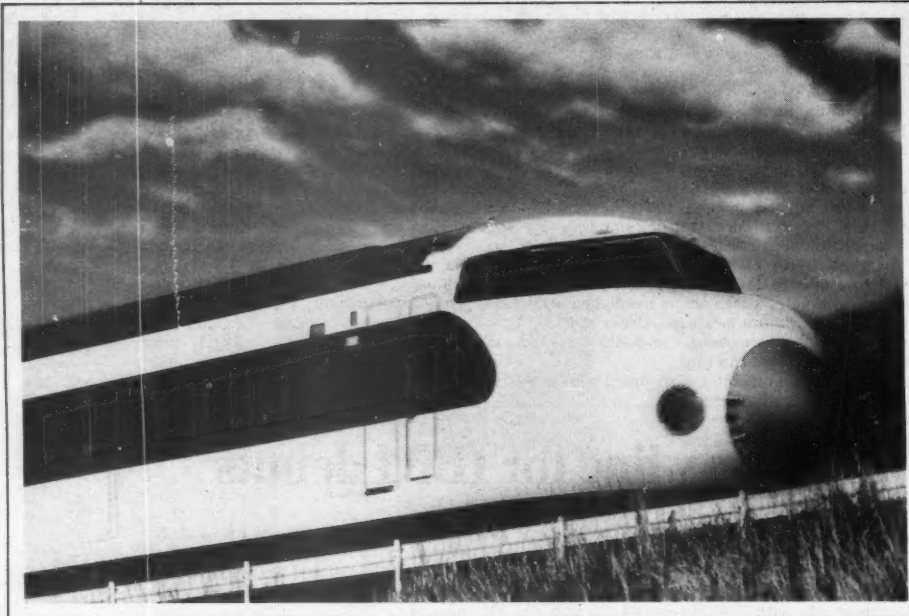
SDI has announced enhanced versions of its VSE disk and tape data set management products, **Reach** and **Epat**.

Release 6 of Reach is said to be totally shared-virtual-area-resident. Catalog-resident free-space tables allow the identification of free space with minimal volume table of contents interaction, allowing files to be allocated as quickly as possible.

Release 6.04 of Epat, SDI's tape management system, includes on-line access and update of the Epat catalog.

Reach costs \$7,050 or may be leased starting at \$260/month. Epat costs \$9,950 or \$300/month.

SDI, 1700 S. El Camino Real, San Mateo, Calif. 94402.



The time-honored philosophy behind our Tri Printer™



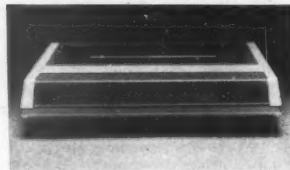
Odd, that a society which, on one hand honors tradition and deliberation should, on the other hand pride itself on technology and speed.

Nowhere, perhaps, is this contradiction more obvious than in the famed Bullet Train's technological heir, the Tri Printer.

As its very name implies, the Tri Printer is three printers in one. With data processing, letter-quality word processing, and high resolution graphics capabilities.

But unadulterated speed is the one trait the Tri Printer is most famous for. At 350 cps in data processing mode and 87 cps in letter-quality mode, it is by far the fastest printer in its class. Such speed that you can turn out a higher volume of work in less time, increasing the efficiency of your business.

The Tri Printer is, quite honestly, a vast improvement over the very printers that IBM, Apple, and DEC make for



their own computers. In fact, we offer you many refinements and additions to their printers.

The Tri Printer works with all your software because it completely emulates the Epson FX-100, IBM Graphics Printer, DEC LA210, or Apple Imagewriter with a mere change of cartridge.

Finally, the Tri Printer is crafted to fit harmoniously into your office environment. For its low profile makes it as pleasant to the eye as its quiet operation makes it to the ear.

But its ultimate destiny is to be known for speed.

On the one hand, the speed with which it prints. On the other, the speed with which you should call us for more information.

CIE TERMINALS

Where craftsmanship is still a tradition.

CIE TERMINALS, INC., 2505 McCabe Way, Irvine, CA 92714-6297. 1-800-624-2516.

© 1986 CIE Terminals, Inc. Tri Printer is a trademark of CIE Terminals, Inc. IBM is a registered trademark of International Business Machines. DEC is a registered trademark of Digital Equipment Corporation. Apple Imagewriter is a trademark of Apple Computer Corporation. Epson is a registered trademark of Epson Corp.

IMSL has introduced the **IMSL Library** and **SFUN/Library** for Digital Equipment Corp.'s Microvax I and II computers using the VAX-11 Fortran compiler, under the MicroVMS operating system.

The IMSL Library allows users to select from over 500 mathematical and statistical Fortran subroutines and to address user-specific problems without developing subroutines for standard portions.

SFUN/Library offers a selection of Fortran subprograms for evaluating special functions.

The IMSL Library costs \$1,200 for the initial year and \$1,000 for renewal. The SFUN/Library costs \$850 for the initial year and \$550 for renewal.

IMSL, 2500 Parkwest Tower One, 2500 Citywest Blvd., Houston, Texas 77042.

Technology Information Products Corp. has announced **Tip Plan It**, its automated support tool for information/entity modeling for IBM mainframes.

Tip Plan It is the interactive graphics software that automates the Tip Plan technology.

The Tip Plan enables business management and information system experts to develop a strategic information system plan to support a business area, according to the vendor.

Tip Plan It is intended to facilitate the entering, updating and maintaining of all the models, diagrams, matrices and supporting documentation.

Tip Plan is priced at \$60,000.

The price includes methodology, software, training and support.

Technology Information Products, 12 New England Executive Park, Burlington, Mass. 01803.

NEW PRODUCTS/MICROCOMPUTERS

MICROS

Systems

Fujitsu Microsystems of America, Inc. has added the multiuser **System 2020** to its Series 2000 family of Pick Systems' Pick-based business computers.

The **System 2020** is powered by the 16-bit Intel Corp. 80286 microprocessor and can accommodate up to eight users.

The system offers standard memory of 512K bytes, expandable to 1M byte, and either 54M or 86M bytes of unformatted built-in hard-disk capacity.

Prices start at \$8,850 for a two-user **System 2020 Model C**, with 512K bytes of memory and 54M bytes of hard-disk storage.

Fujitsu, 3025 Orchard Pkwy., San Jose, Calif. 95134.

Kamerman Labs has announced that it will include four software programs from Borland International with its **Kamerman Labs AT-Plus-1800** computer.

The **IBM Personal Computer AT-compatible** system features a 1.2M-byte floppy drive and a 20M-byte fixed disk.

The four software products are **Turbo Lightning**, **Reflex/The Analyst**, **Turbo Pascal** and **Superkey**.

The entire system is priced at \$1,999.

Kamerman Labs, 7861 S. W. Cirrus, Beaverton, Ore. 97005.

Software applications packages

Demetree Software has introduced its **Personnel Management Series** for the **IBM Personal Computer** family.

The series includes the **Personnel Director**, said to analyze and store information on up to 2,000 employees; the **Personnel Director Report Writer**, said to access and sort data from the **Personnel Director** to create customized reports; and **Impact**, a program for performance evaluations and career planning.

The **Personnel Director** costs \$695. The **Personnel Director Report Writer** costs \$195. **Impact** costs \$895.

Demetree Software, 3340 Edgewater Drive, Orlando, Fla. 32804.

IBM has announced two series of accounting programs for **IBM Personal Computers** called the **IBM Business Adviser** and the **IBM Accounting Assistant** series.

The **IBM Business Adviser** is a set of eight integrated

modules including a data base manager, a network extension edition and six accounting editions.

The **IBM Accounting Assistant** series is a set of six accounting programs that can function independently or as an integrated system.

The **IBM Business Adviser** accounting editions are priced at \$995 each. The data base manager costs \$225, while the network extension series costs \$245 per remote PC.

The **IBM Accounting Assistant** series editions are priced at \$595 each.

IBM, 900 King St., Rye Brook, N.Y. 10573.

Leonard Financial Planning Systems, Inc. has released **TIPS**, the Tax Investment Planning System, for use on **IBM Personal Computers**.

TIPS was designed to assist the income tax planning

or investment adviser in selecting, marketing and monitoring tax-advantaged investments.

The system offers screen modeling of income taxes and investment recommendations, a Help screen, function keys and two-dimensional cursor control.

TIPS is priced from \$995 to \$1,395.

Leonard Financial Planning Systems, Suite 400, 4600 Marriott Drive., Raleigh, N.C. 27612.

Computer Graphics Group, Inc. has announced **Prograf**, a graphics program for the **IBM Personal Computer**.

Prograf offers standard business charts as well as specialized charts. These specialized charts include ratio, decision, organization, loading, histogram and variance.

Prograf can combine different charts. It also lets users add free-form graphics

Continued on page 90

What can you
count on for timely
systems solutions?

CMI COMMITMENT

At CMI, we work hard to provide you with long-term solutions for your data processing and telecommunications needs. Our creative professionals are committed to spending the time and energy necessary to make your job easier.

Depend on us, too, for technical support, from selection and planning through reconfiguration, delivery and installation. We offer creative lease arrangements for all your capital equipment needs. CMI can even handle the trade-in or resale of your equipment.

CMI has long been a leading supplier of new and used IBM and AT&T equipment. Our range of services has now been extended to include all brands of data processing and telecommunications equipment. That's why many Fortune 500 companies turn to CMI for their changing technology needs. CMI gives you greater flexibility for today as well as tomorrow. CMI is the Intelligent Alternative.



A Trichmark Company

CMI Corporation

2600 Telegraph Rd., P.O. Box 2026, Bloomfield Hills, MI 48303-2026
(313) 456-0000/TWX: 810 232-1667

NEW PRODUCTS/MICROCOMPUTERS

Continued from page 89

and text anywhere on a chart. Charts can be customized by changing colors, patterns, line styles and borders. Up to 10 type fonts in 10 sizes are available. Up to eight colors can be used on a single graph.

Prograf is priced at \$149. Computer Graphics Group, 568 14th St. N.W., Atlanta, Ga. 30318.

Software Publishing Corp. has introduced **PFS:Workmates**, a permanent bundle of four PFS software programs for Apple Computer, Inc. Apple IIc and IIe computers using the ProDOS operating system.

The four products are: PFS:Write, a word processing package; PFS:File, an electronic filing system; PFS:Report, which generates summary reports of PFS:File data; and PFS:Plan, a row-and column-oriented spreadsheet.

The PFS:Workmates bundle includes both 5¼-in. and 3½-in. disks.

The PFS:Workmates bundle costs \$250. PFS:File and PFS:Report are available together for \$125.

Software Publishing, P.O. Box 7210, 1901 Landings Drive, Mountain View, Calif. 94039.

Software languages

National Instruments has announced **support packages** for Venturcom, Inc. Venix/86, IBM Xenix and Santa Cruz Operation, Inc. Xenix as well as **language interfaces** for True Basic, Inc. True Basic and Summit Software Technology, Inc. Better Basic.

The Venix/86 and Xenix software packages work with National Instruments, Inc.'s general-purpose interface bus (GPIB) personal computer hardware or the GPIB Adapter from IBM.

The software includes a handler and configuration and diagnostic utilities. It also includes an interactive control program.

The language interfaces for True Basic and Better Ba-

sic allow users to write programs that are able to communicate with the National Instruments GPIB personal computer hardware.

The Venix and Xenix support packages cost \$200.

The language interfaces cost \$50.

National Instruments, 12109 Technology Blvd., Austin, Texas 78727.

Virtual Systems, Inc. has

introduced its **Microbench C** language compiler.

Microbench C is said to produce optimized code for the Intel Corp. 8086 family of microprocessors.

Microbench C runs under Microsoft Corp. MS-DOS or IBM PC-DOS on the IBM Personal Computer or compatibles.

Its runtime library provides a set of Unix standard I/O services.

A separate library is provided for read-only memory

(ROM)-based applications, which include the source for a ROM-BIOS I/O interface.

Microbench C is priced at \$500.

Virtual Systems, Suite 406, 1500 Newell Ave., Walnut Creek, Calif. 94596.

True Basic, Inc. has released a version of the **True Basic** language system which supports Apple Computer, Inc.'s Macintosh XL micro-

computers.

According to the vendor, True Basic on the Macintosh allows access to 100% random-access memory as well as 98% of read-only memory-resident routines.

True Basic is a structured version of Basic that enables users to create, modify and maintain programs.

The Macintosh version of True Basic carries a price tag of \$149.

True Basic, 39 S. Main St., Hanover, N.H. 03755.



IBM/38-36 BACKLOG REDUCTION

The world's most successful companies have made Fusion Products Intl. the leading supplier of query/report-processor and spreadsheet software for the IBM/38-36. Call 415 461-4760 or write.

Fusion Products International
900 Larkspur L.C. Suite 295
Larkspur, CA 94939, Telex 176099

FUSION

NEW PRODUCTS/MICROCOMPUTERS

Software utilities

Goldata Computer Services, Inc. has announced **Save Our Spreadsheet**, a memory-resident software utility for the IBM Personal Computer and compatibles.

The utility is said to automatically, at regular intervals, save to disk Lotus Development Corp. 1-2-3 spreadsheets currently in random-access memory (RAM).

According to the vendor,

the length of time between saving to disk is user determined.

The program requires 2K bytes of RAM and is priced at \$29.95.

Goldata Computer Services, 2 Bryn Mawr Ave., Bryn Mawr, Pa. 19010.

Simpletec, Inc. has introduced **Diskview**, a disk manager for IBM Personal Computers and compatibles with

hard disks.

Diskview is said to allow users to survey all files on multiple disks present in the system and view the contents of any file. Users can also execute a program, copy, delete and rename files as well as format disks.

Diskview simplifies access to files in tree-structured directories. DOS commands are replaced by single-letter commands.

Diskview costs \$39.

Simpletec, Suite 130, 1852

Century Place, Atlanta, Ga. 30345.

Personics Corp. has announced **Smartnotes**, a memory-resident software package for IBM Personal Computers said to allow users to attach notes to data base records, spreadsheet cells, letters, memos and reports.

Users of Smartnotes can view the computer screen

with notes showing or can hide notes to reveal the text or numbers that the notes are covering. They can be attached anywhere within a computer document and do not alter the file or program in any way, the vendor states.

Smartnotes costs \$79.95.

Personics, Building Two, 2352 Main St., Concord, Mass. 01742.

Intellution, Inc. has introduced **Fix Shell**, a multitasking environment for IBM's PC-DOS operating system.

The Fix Shell is an optional module for use with Intellution's integrated control system package, The Fix. It provides a user-configured master menu from which foreground and background programs are selected. In addition, it intercepts keyboard reboot commands.

According to the vendor, background and foreground programs run concurrently. Up to 16 background programs are supported.

A C language library is included.

The Fix Shell costs \$150.

Intellution, 35 Perwal St., Westwood, Mass. 02090.

Software enhancements

Sydetech System Development Technologies has released **Version 3 of C-Display Utilities**, consisting of the C-Display Compiler and the C-Display Librarian.

The C-Display Compiler is a screen management utility said to allow users to design full screen and window display forms. It has editing capabilities and supports colors and character-generated graphics.

The C-Display Librarian is a library of C functions said to allow users to execute BIOS video services, perform virtual display management, create bit-mapped graphics and conduct interactive screen I/O.

The C-Display Compiler costs \$125. The C-Display Librarian costs \$145.

Sydetech, #17C, 43-23 Col-den St., Flushing, N.Y. 11355.

Summagraphics Corp. has released **Version 3 of its Mactablet graphics tablet software**.

Continued on page 92

Announcing new power behind the power behind your computers.

The course of independent computer maintenance is changing. Sorbus,* already rated best among all third party service providers,* has been made even better. Sorbus is now a member of the Bell Atlantic™ family of companies.

That brings a wealth of resources to a company already rich in them. New stability and strength to a company with 1,600 field engineers, 190 nationwide service centers, an on-line computerized Field Inventory System that tracks 230,000 part numbers, an average two-hour response time, and a 24-year record of excellence.

Sorbus offers service covering virtually every major brand and 400 different computer product types. Sorbus services more IBM® than anyone, except IBM, including 34s, 36s, 38s, 370s, and 4300s, 303Xs and the PC family. And Sorbus' scope of service ranges from mainframes to minis, PCs to peripherals, and whatever else might be in-between.

Being a part of a 19-billion dollar corporate giant, those capabilities can only improve. That fact alone should take the wind from the sails of everything you used to believe about independent computer maintenance.

Sorbus®

A Bell Atlantic™ Company

50 E. Swedesford Road, Frazer, PA 19355
Phone: 1-800-423-2797 (In PA: 215-296-2940)

*Rated best for 10 years by leading computer trade publications.
For complete details contact Sorbus.

IBM is a registered trademark of International Business Machines, Inc.

MANAGEMENT
REPORTING/RETRIEVAL
CAPABILITY

for THE IBM S/38

For more information
Contact Charles White at:
michaels, ross & cole, ltd.
800 West Roosevelt Road
Building E, Suite 304
Glen Ellyn, IL 60137
(312) 790-5040

NEW PRODUCTS/MICROCOMPUTERS

vironment of graphics programs, is a display list drawing program for three-dimensional drawing.

Texture-mapping is a technique used to wrap two-dimensional painted or scanned-in images onto 3-D objects.

Artwork Environment software is priced in a range from \$750 to \$2,500.

West End Film, 1825 Q St. N.W., Washington, D.C. 20009.

Chang Labs has introduced **Fileplan Version 4**, a sales management data base system for IBM Personal Computers and compatibles.

According to the vendor, Fileplan will print letters, envelopes and mailing labels, customize and personalize form letters as well as manage fol-

low-up schedules.

Additionally, it will track call reports and telephone logs, quota goals and commissions and expense reporting and tickler systems, according to the vendor.

Features include spreadsheet and forms mode, color coding and upward compatibility with Ashton-Tate's Dbase III.

The cost of Fileplan Version 4 is \$199.95.

Chang Labs, 5300 Stevens Creek Blvd., San Jose, Calif. 95129.

Coefficient Systems Corp. has announced **Vterm III**, an enhanced version of its Vterm II integrated software package for communications between IBM Personal Computers and Digital Equipment Corp. VAX

and PDP-11 computers.

According to the vendor, Vterm III combines VT100 terminal emulation, multiprotocol file transfer and asynchronous communications capability up to 19.2K bit/sec.

Vterm III costs \$195. Users of Vterm II can upgrade for \$70.

The cost of Vterm III with CT100 and Tektronix, Inc. 4010 terminal emulation is \$249.

Coefficient Systems, 611 Broadway, New York, N.Y. 10012.

Learncom, a division of Sandy Corp., has enhanced its **System for Authoring Microtraining (SAM)** and its **MIC 2000 Interface Controller** to be compatible with IBM's Enhanced Graphics Adapter (EGA).

The EGA card allows developers

of computer-based training and interactive videodisk to have 640 by 200 pixel graphics with full capabilities including free-hand sketch, 80- and 40-col. text and 16 colors, according to the vendor.

The enhanced MIC System 2000A costs \$1,950. The EGA card is not included. The cost to license SAM starts at \$3,500 for the first year.

Learncom, 215 First St., Cambridge, Mass. 02142.

Morgan Computing Co. has released **Version 2.2 of Advanced Trace86**, offering an assembly language interpreter including a full-screen symbolic debugger.

Advanced Trace86 features the ability to trace .EXE or .COM programs in disassembled format with labels and variable names scanned from the .MAP file.

While single-step tracing, the user can see all the registers and flags, the stack and a portion of the memory, according to the vendor.

Users of Advanced Trace86 can set break points and skip over code at native speed. In addition, users can watch memory contents accessed and changed and flip to a special screen save window.

The cost of Advanced Trace86 Version 2.2 is \$175.

Morgan Computing, P.O. Box 112730, Carrollton, Texas, 75011.

Pick Systems has announced **Release 2 of the Pick operating system** for the IBM Personal Computer XT.

Release 2 includes the ability to extract formatted data directly from Pick/Basic via the Execute command and support of streaming-cartridge tape backup.

According to the vendor, it also provides a data-transfer bridge between files created under the Pick and Microsoft Corp. MS-DOS operating systems. An application generator has also been added.

Release 2 supports the Western Digital Corp. disk controller, the IBM 3161/3162 and Esprit Systems, Inc. terminals and three additional parallel ports.

Release 2 of the Pick operating system costs \$495.

Pick Systems, 1691 Browning, Irvine, Calif. 92714.

Communications

Codenoll Technology Corp. has announced its **Codenet-3050 IBM PC Network Fiber Optic Transceiver/Adapter** and its **Codenet-3550 Fiber Optic Backbone System**.

The 3050 converts any IBM PC Network adapter card from a broadband, coaxial local-area network to a fiber-optic, local-area network.

The 3550 is said to attach a fiber-optic transceiver to the Intel Corp. 82586 and 82186 coprocessors and Netbios interface on the PC Network adapter card, providing a means for interconnecting up to 32 IBM Token-Ring networks and PC Networks.

The standard 3050 is for network clusters with up to 16 Personal Computers. The high-power model is for clusters with up to 64 PCs.

They cost \$495 and \$750, respectively. The basic Codenet-3550 adapter kit starts at \$895.

Codenoll Technology, 1086 N. Broadway, Yonkers, N.Y. 10701.

"Lee Data does. It's right here in the new Lee Data Passport."

PASSPORT
Solutions For
Enhanced Networking
And Local Processing

way to access multiple applications.

And the Open Window display will support your current applications in any screen size. Without modification. In either monochrome or 7-color presentations.

All this, without the high cost of PC's.

To learn more about the new Open Window display and other solutions for your growing information network, get the new Lee Data Passport.

For your FREE copy, call 1-800-LEE-DATA.
In Minnesota, call (612) 828-0300.

**LEE DATA
CORPORATION**

© 1986 Lee Data Corporation

NEW PRODUCTS/MICROCOMPUTERS

Complementary Solutions, Inc. has announced **Telemate**, a personal computer software product said to manage phone calls.

Telemate lets Microsoft Corp. MS-DOS and IBM PC-DOS computers become data collection devices to capture an organization's phone activity at the same time as other programs are being used. It contains a phone directory and reporting system. Options available include a custom report writer and a system for calculating the cost of each phone call.

Telemate is priced between \$495 and \$1,195.

Complementary Solutions, Suite 317, 4470 Chamblee-Dunwoody Road, Atlanta, Ga. 30338.

Racore Computer Products, Inc. has introduced the **Lanpac**, a ring concept local-area network for IBM Personal Computers and compatibles.

Lanpac consists of proprietary local-area network ring architecture on a plug-in network interface card. It is said to transfer data at the rate of 2M bit/sec.

Lanpac can link up to 250 stations in any combination, with up to 1,000 ft between nodes.

Basic Lanpac costs \$295 per node.

Racore Computer Products, 10 Victor Sq., Scotts Valley, Calif. 95066.

Cbis, Inc. has introduced a **twisted-pair wire interface** for its **Network-OS** series of local-area network operating systems for the IBM Personal Computer, Personal Computer XT, AT and compatible microcomputers.

According to the vendor, the interface will allow Network-OS to transfer data at 2.25M bit/sec. It also offers an open-bus structure said to provide easier integration of multiple workstations.

The twisted-pair wire interface costs \$395.

Cbis, 2323 Cheshire Bridge Road, Atlanta, Ga. 30324.

ESI has announced a **Wang Laboratories, Inc. Professional Computer** version of its **Micropulse** host/microcomputer information retrieval system.

Micropulse is said to provide multiuser access for the Wang Professional Computer in native mode to data stored on all Burroughs Corp. mainframes, including the V and A series. It allows the micro user to access mainframe data in a secure, controlled environment.

According to the vendor, Micropulse provides management of the host environment.

Micropulse for the Wang Professional Computer is priced from \$22,000 to \$35,000, depending on the host system.

ESI, 3200 Commonwealth Blvd., Tallahassee, Fla. 32303.

Microsoft Corp. has released **Microsoft Access Version 1.01**.

Access is said to offer a menu system for information and electronic mail services, a built-in language and the capability for hooking up to multiple sources. It also includes conver-

sion utilities for application programs as well as personal computer-to-mainframe and PC-to-PC communications.

Version 1.01 of the business information access program for electronic communications includes updated custom menus, a new installation feature for hard disks, speed enhancements and non-copy-protected disks.

Microsoft Access is priced at \$250. Registered owners of Microsoft Access will receive the new version free.

Microsoft, Box 97017, 16011 N.E. 36th Way, Redmond, Wash. 98073.

Elkonix Corp. has announced an **interface package** for its digital imaging cameras said to allow IBM Personal Computers and compatible sys-

tems to act as host computers for storing, retrieving and manipulating image information.

The package consists of an IEEE 488 card and a customized PC interface card connected by a 12-ft cable. One card is installed in the camera's electronic support unit, the other in the host computer.

The package enables the Eikonix Series 78/99, Series 850 and E-Z Scan Model 4334 digital imaging systems to transmit data to microcomputers at a rate of up to 1M bit/sec.

The package costs \$2,500.

Eikonix, 23 Crosby Drive, Bedford, Mass. 01730.

Network Software Associates, Inc. has announced a version of its **Adaptsna PC Com** product, a Syn-

chronous Data Link Control (SDLC) personal computer-to-personal computer communications link for the IBM Personal Computer, Personal Computer XT, AT and compatibles.

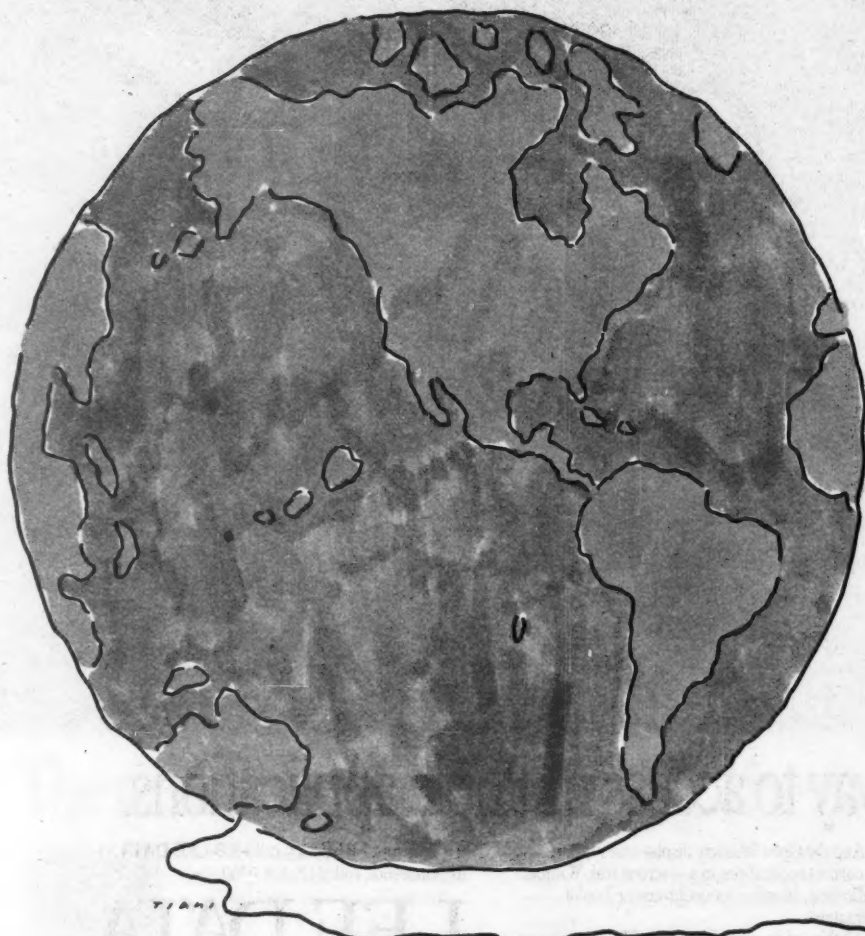
The product is said to operate at speeds up to 19.2K bit/sec. It features automatic operation, remote control, automatic dialing and call directory.

The software-only version requires 128K bytes of memory, IBM's SDLC adapter board and a synchronous modem.

A software-hardware configuration adds the company's Adaptmodem. An alternate software-hardware version uses Network Software's Adaptcom board, an SDLC adapter and an external modem.

The software-only version costs \$475, the PC Com-Adaptmodem combination costs \$1,270 or \$720 with

NOW IBM PROFS USERS



NEW PRODUCTS/MICROCOMPUTERS

PC Com-Adaptcom.

Network Software Associates,
22982 Mill Creek, Laguna Hills, Calif.
92653.

Softronic, Inc. has announced a new version of its **Softerm PC** data communications product.

The new version is said to offer a seamless file transfer feature. According to the vendor, the file transfer process does not interrupt application programs.

Softerm PC is currently bundled with Oneshot, a program from Data-viz Corp. said to enhance Softerm PC's micro-to-mainframe capabilities by providing format conversion from ASCII text files to any of seven PC formats.

Softerm PC is priced at \$195.

Softronic, Suite 210, 7899 Lexington Drive, Colorado Springs, Colo. 80918.

AST Research, Inc. has introduced the **AST-5250/Async Dialup** package said to enable a remote IBM Personal Computer, Personal Computer XT, AT or compatible to communicate asynchronously with an IBM minicomputer.

The package is said to provide AST 5251 Model 11 display terminal emulation. The AST 5251 Model 11 series products provide personal computers with local attachment to IBM System/34, System/36 and System/38 hosts via standard twin-axial cable.

The package includes facilities for bidirectional file transfer and a hot

key for switching between concurrent IBM PC-DOS and host sessions.

The AST-5250/Async Dialup package costs \$395.

AST Research, 2121 Alton Ave., Irvine, Calif. 92714.

Simware, Inc. has announced a version of **SIM/PC** that is compatible with the Data General Corp. DG/One laptop computer.

SIM/PC is an asynchronous communications package for the IBM Personal Computer and compatibles. It is said to provide users with a micro-to-mainframe link, file transfer capabilities, menu- or command-driven operation, application development command language and file management utilities.

When SIM3278, Simware's main-

frame protocol conversion software, is installed on the host, a DG/One can emulate a 3270-type terminal.

Single copy prices are \$250.

Simware, Suite 100, 14 Concourse Gate, Nepean, Ont., Canada K2E 7S6.

Network Software Associates, Inc. has introduced **Adaptmodem/ACC**, an enhanced version of its Adaptmodem, a combination synchronous modem and Synchronous Data Link Control communications adapter for IBM Personal Computers.

Adaptmodem/ACC, a full-slot expansion board including an on-board AT&T 201-compatible 2,400 bit/sec. synchronous modem, is said to incorporate the vendor's Automatic Call Control (ACC) facilities. ACC provides call control features including autodial, autoanswer, redial, a 180-entry call directory, automatic phone-line and modem testing plus modem configuration options.

The Adaptmodem/ACC package costs \$795.

Network Software Associates, 22982 Mill Creek, Laguna Hills, Calif. 92653.

Multi-Tech Systems, Inc. has introduced **Multimodem PC3**, a half-card 1,200/300 bit/sec. modem for the IBM Personal Computer, Personal Computer XT, AT and compatibles.

The Multimodem PC3 is an asynchronous communications device. It features Hayes Microcomputer Products, Inc. AT command set compatibility, autodial and autoanswer, two phone jacks, a built-in speaker and half- or full-duplex operation. It offers a 20-phone-number directory.

The Multimodem PC3 costs \$299 including all hardware, communications software and phone cable.

Multi-Tech Systems, 82 Second Ave. S.E., New Brighton, Minn. 55112.

Micom Systems, Inc.'s Micom-Interlan has announced the **NI5010 Data Link Controllers**, said to allow IBM Personal Computers, Personal Computer XTs and ATs to participate in Digital Equipment Corp. Decnets.

The NI5010 interfaces the IBM PCs and compatibles to Ethernet local-area networks, providing 10M bit/sec. communications. DEC's Decnet-DOS software provides protocol supports.

Two versions are available. One includes an on-board transceiver for thin-cable Ethernet. The other provides an IEEE 802.3-standard transceiver. They are priced at \$650 and \$550, respectively.

Micom Systems, P.O. Box 8100, 4100 Los Angeles Ave., Simi Valley, Calif. 93062.

Packet/PC, Inc. has added VM/VTAM and IBM 3708/3710 support to its **Packet/3270**, the IBM Personal Computer Systems Network Architecture (SNA)/asynchronous communications link.

Packet/3270 is said to support all major SNA 3270 applications including IBM's CICS, IMS, TSO, and Distributed Office Support System and internally written applications.

Continued on page 99

CAN COMMUNICATE WITH THE WORLD.

INTRODUCING MCI MAIL LINK TO PROFS.

While PROFS™ has always been great at letting people in your company talk to each other, communicating with the outside world was impossible.

Until now.

Now there's MCI Mail Link™ to PROFS. MCI Mail Link lets you use PROFS to communicate to anyone, anytime, anywhere—outside your PROFS network. From business partners to business prospects, all over the world.

So now you can send PROFS Notes and Final Documents to lots of people, lots of ways. Send postal mail with your letterhead and signature. Telex messages around the world. Even send electronic

messages to users of other mail systems.

And expanding your PROFS communications capabilities won't cost you the world. You don't have to build a network... just plug into ours. The software is easy to install. There's no new equipment to buy. No costly retraining. In fact, MCI Mail® will save you money every time you use it.

Take the first step in reaching the world. Call MCI Mail for more information at 800-MCI-2255. In Washington, DC, call 833-8484. And instantly you'll start turning your isolated PROFS network into a global communications network.

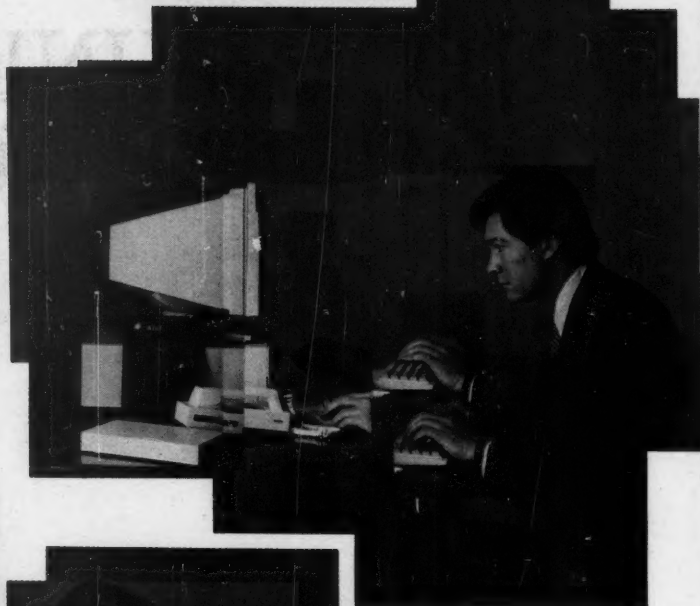
MCI





AT&T 724 Multiplexer

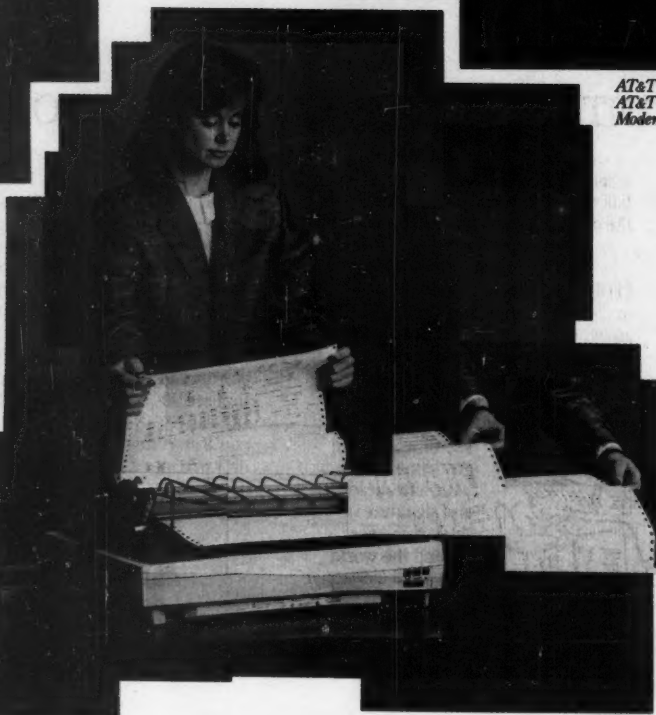
**AT&T DATAPHONE II
System Controller**



**AT&T PC 6300
AT&T Model 4000
Modem**



AT&T Multifunction Communication System
© 1986 AT&T Information Systems



**AT&T 455
Printer**

How AT&T's unrivaled strength in communications helps you build a better information network.

AT&T's approach to network management and control reflects a century of communications experience. And a century of leadership.

Here's what it means to you.

Performance you can rely on. AT&T is the only company that offers you complete management of digital, analog and private line networks with *one* system—the evolving DATAPHONE® II system product line.

It's a full line of modems, Data Service Units and multiplexers that combine network managing and diagnostic capabilities to deliver maximum uptime from an integrated *system*.

The mainframe connection. When you're in the 3270 environment, the AT&T 6500 Multifunction Communication System makes a lot of sense. Full compatibility, access to multiple synchronous or asynchronous hosts, plus powerful multitasking, put maximum mainframe muscle on the desktop.

AT&T 3B Computers working with our BSC/SNA connectivity software give you departmental processing of mainframe data.

We make the pieces fit. Flexibility and adaptability set AT&T networks apart in both local and departmental use. Systems like the AT&T STARLAN NETWORK and 3B NET give you the network best suited to corporate requirements with no sacrifice in control of your computer resources.

And with our Information Systems Network (ISN), you can even link your current systems and networks to equipment from other manufacturers.

Computers made to communicate.

Both the AT&T PC 6300 line and the AT&T UNIX™ PC merge computing with communications. Optional or built-in modems and communications management software make simultaneous voice and data exchanges as simple as a few keystrokes.

And thanks to UNIX System V, the entire AT&T 3B Computer family offers integrated and flexible communications for departmental computing solutions.

A compatible family. AT&T UNIX System V-based computers are compatible within the line. And beyond that, AT&T offers computers, terminals and printers that are operationally compatible with accepted market standards.

The results are easy integration as well as protection for your existing hardware and software investments.

The computers with the future built in. As your needs change and technology advances, AT&T network management products will provide accommodation without obsolescence.

To learn more, call your AT&T Information Systems Account Executive, your authorized AT&T supplier or simply dial 1 800 247-1212.

Because when you invest in information, we think you deserve a continuing return.



AT&T

The right choice.

How to be seen at NCC by people who will be there — and by people who won't be

As many as 70,000 computer-involved professionals, your customers and potential customers, will be at NCC in Las Vegas this June 16-19. And you'll no doubt make contact with many of them at the show.

But you can also make contact with a great many more — 687,300, to be specific. In the three issues surrounding NCC, Computerworld will give extensive, in-depth coverage of this major event. Our Preview issue of June 9, chock-full of product announcements and information, offers a great opportunity to tell those planning to attend where your exhibit can be found. And it offers an opportunity to tell those who won't be there about your products.

Our Show issue of June 16,

containing still more product information, will be distributed by the thousands from our booth at NCC. It's your chance to make nonattendees part of the show — and your exhibit.

And our June 23 Wrap-up issue will take a close look at what happened at NCC. Plus, it gives you a chance to reinforce your NCC message after the show.

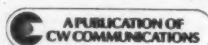
So don't miss this opportunity to extend your NCC program far beyond Las Vegas — and into offices — with the help of Computerworld and these three special issues.

Call your Computerworld representative today to reserve your space in these NCC issues. Or call Ed Marecki, Vice President/Sales, at (617) 879-0700.

ISSUE	NCC Preview	NCC Show	NCC Wrap-up
ISSUE DATE	June 9	June 16	June 23
COLOR CLOSING	May 23	May 30	June 6
B/W CLOSING	May 30	June 5	June 13

COMPUTERWORLD

Boston: (617) 879-0700 New York: (201) 967-1350 Atlanta: (404) 394-0758
Chicago: (312) 827-4433 Dallas: (214) 991-8366 San Francisco: (415) 421-7330
Los Angeles: (714) 261-1230



NEW PRODUCTS/MICROCOMPUTERS

Continued from page 95

At the PC, Packet/3270 requires IBM PC-DOS or Microsoft Corp. MS-DOS, 128K bytes of memory and an asynchronous communications adapter. At the host, MVS support requires VTAM Version 2; VM support requires VTAM Version 3.

The host license is \$7,500, and the PC license ranges from \$145 to \$295.

Packet/PC, 270 Farmington Ave., Farmington, Conn. 06032.

Anchor Automation, Inc. has announced the **Signalman Lightning I**, a 2,400 bit/sec. autodial, add-in board modem for the IBM Personal Computer family and compatibles.

The half-card modem operates asynchronously. It has an automatic equalizer and fallback to 1,200 or 300 bit/sec. It comes bundled with Lync communications software from Norton-Lambert, Inc., providing three modes of operation, a range of modem control commands, data transfer features, password security and diagnostics.

The Lightning I is priced at \$499. Anchor Automation, 6913 Valjean Ave., Van Nuys, Calif. 91406.

At-Eze, Inc. has announced **Shadow**, a product said to allow a master system to take over any off-site IBM Personal Computer or compatible and to provide full local-area network access.

Shadow displays and uses all standard IBM characters, graphics characters and attributes. On-screen instructions can be supplemented with voice. Software can be installed, modified, updated and transferred in both directions. Shadow can also be used to run software on any installation from any installation in the communications network.

Shadow is priced at \$149.95.

At-Eze, 418 Kings Way, Mundelein, Ill. 60060.

Samna Corp. has announced versions of its **Samna Word III** and **Samna+** software programs tailored for microcomputer systems connected by the IBM PC Network.

Samna Word III features spelling correction, automatic table of contents and index generation, among other features. Samna+ combines word processing with a spreadsheet and Wordbase Manager, a function that locates words and phrases within Samna files. The software is said to offer users access to an expanded selection of multiple printers.

Prices for Samna Word III range from \$1,250 for a three-user system to \$11,000 for a 30-user system. Samna+ ranges in price from \$1,550 to \$13,850.

Samna, Suite C-700, 2700 N.E. Expwy., Atlanta, Ga. 30345.

Data storage

First Class Peripherals has introduced the **B-Sider**, a tape backup system that works with its Winchester hard-disk subsystems, the **Sider** and **Sider II** and the **Apple Computer, Inc.** **Apple IIe** and **II+** computers.

The B-Sider backs up either the 10M-byte Sider or 20M-byte Sider II. It features a 20M-byte streaming cassette tape. The backup unit shares

the host adapter and bus with the Siders.

The B-Sider is priced at \$695.

First Class Peripherals, 3579 Highway 50 E., Carson City, Nev. 89701.

Printers/Plotters

Microvitec, Inc. and **Ultra-graphics Corp.** have announced the **Microvitec Definition 895 DU** color graphics monitor and the **Ultra-graphics 800** graphics and text card.

Designed to work together, the products are said to provide a business graphics or computer-aided design system with flicker-free resolution of 800 by 400 pixels in 16 colors on an IBM Personal Computer or Personal Computer AT.

The Definition 895 DU monitor has a 14-in., high-contrast, antiglare

Continued on page 102

Advertisement

Advertisement

SYSTEM 2000 DBMS Drives Industry with \$12,000 License

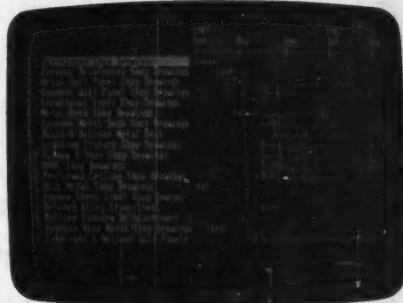
SAS Institute Inc. establishes SYSTEM 2000 Data Base Management System at the forefront of cost-saving productivity tools with its \$12,000 first-year licensing plan. The system includes: an integrated data dictionary, on-line query/update, a report generator, relational data base access, programming language interfaces, high-quality training and technical support, and more.

In addition, users can now link SYSTEM 2000 DBMS with the SAS® System of software to build data bases, store and retrieve data, merge and manipulate data, perform analyses, and produce reports and presentation graphics. Even Information Center users can gain access to SYSTEM 2000 DBMS through easy-to-use SAS menus.

To learn more about the most economical data base management system in the industry, write or call the SYSTEM 2000 Sales Department at SAS Institute Inc., Box 8000, SAS Circle, Cary, NC 27511-8000. Telephone (919) 467-8000. Telex 802505.

SAS and SYSTEM 2000 are registered trademarks of SAS Institute Inc., Cary, NC, USA. Copyright © 1986 by SAS Institute Inc. Printed in the USA.

You do the easy chart. We'll do the hard chart.



GANTT: The easy chart.



PERT: The hard chart Microsoft Project creates for you.

Hand us the makings of a simple Gantt chart and watch Microsoft® Project Version 2.0 effortlessly create the corresponding PERT chart.

Other programs leave the PERT chart up to you, shifting the complex job of connecting and re-connecting tasks onto your shoulders. So, if you're already carrying your share of the workload, schedule a critical look at our new Version 2.0.

Compare, for example, how Version 2.0 surpasses other software, even its highly acclaimed predecessor, Version 1.0, in making storing, sorting and tracking details as natural as possible.

Notice the ease of entering activities and deadlines via our exclusive project management spreadsheet, rather than through monotonous tables and convoluted commands.

And pay particular attention to Microsoft Project's ultimate user interface. People. There's a whole company full, only a phone call away. All poised to fix problems, schedule training seminars, or otherwise do what it takes to make Microsoft Project fit into your plans. And vice versa.

We even share the work when it comes to learning Microsoft Project. To start, all you have to do is come up with a question.

Then our computer-based training program, and its unprecedented complement of over two dozen interactive lessons, does its part. Gently coaxing you towards the answer at your own pace.

Evaluating Microsoft Project shouldn't be a project.

Thanks to our interactive demonstration diskette, taking a hard look at Microsoft Project is easy to take.

For \$10, you can schedule events by the minute or hour, compare plan versus actual results, spew out reports and otherwise resolve that nagging question: will this work for me?

To get your copy, you don't even have to leave your chair. Just call 800-426-9400 (206-882-8088 in Washington State and Alaska; 416-673-7638 in Canada), or mail the coupon below.

We don't want you doing more work than you have to.

Microsoft® Project The High Performance Software™

I WANT TO SEE HOW MICROSOFT PROJECT FITS INTO MY PLANS.

- ☐ Yes, please send me a Microsoft Project Version 2.0 demo disk. Enclosed is my check or money order for \$10.00, plus sales tax, where applicable. (No cash payments, please.)
- ☐ I only want the facts in writing, thanks. Please send me more information on Microsoft Project.

Name/Title _____

Company _____

Address (no P.O. Box) _____

City _____ State _____ ZIP _____

Phone Number () _____

To order, send this form along with your payment, to:

Microsoft Project Demo Fulfillment

13221 S.E. 26th Street, Suite L, Bellevue, WA 98005

*California residents add 6.0% sales tax (\$6.00). Washington state residents add 5.1% sales tax (\$5.81). Offer expires July 31, 1986. Please allow 6 weeks for delivery. Tutorial and demonstration software for IBM® Personal Computers and compatible only. Offer good only in U.S.A.

CW3

Now there's an IBM personal printer that can play whatever you compose.



It doesn't matter if you're writing contracts or concertos; whether you print labels, librettos or on letterheads—IBM has a personal computer printer that is perfect for your needs.

If you're looking for speed, all-points-addressable graphics

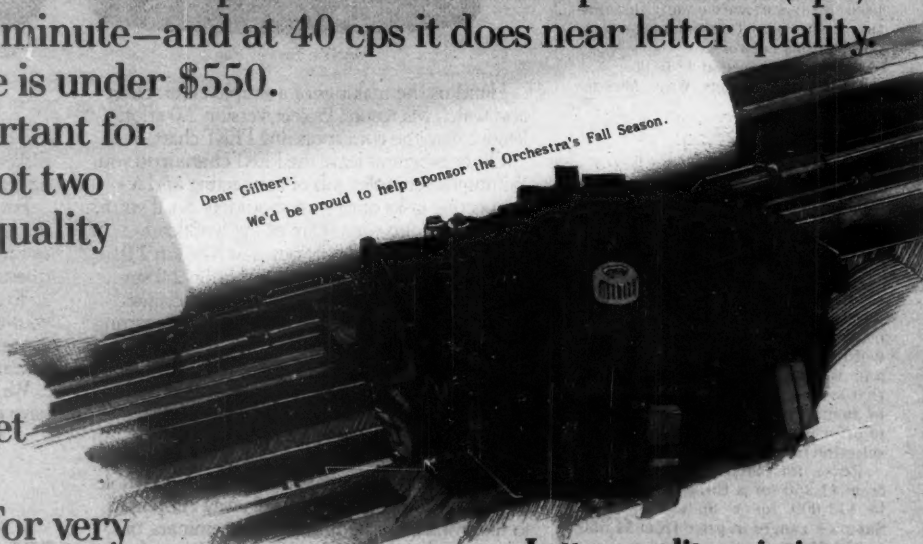
and versatile paper handling, there's the dot-matrix IBM Proprinter. For drafts

it does up to 200 characters per second (cps)

—about three pages a minute—and at 40 cps it does near letter quality. Surprisingly, the price is under \$550.

If letters are important for your business, we've got two extraordinary letter-quality machines. The IBM Quietwriter® Printer gives you high-quality printing, whisper-quiet operation and high-resolution graphics. For very sharp letter quality, easy paper handling and carbon copies, there's the IBM Wheelprinter.

Dear Gilbert:
We'd be proud to help sponsor the Orchestra's Fall Season.



Letter-quality printing

Ticket Sales



Text and color graphics

When your compositions call for color you can call upon the brilliance of the Color Jetprinter from IBM. It combines splendid color, near-letter-quality text and the capacity to work—in color—with a wide range of the latest software. And it's also all

points addressable for virtually any kind of graphics.

Lastly, if you really do need to put notes on paper—or print floor plans or other complex diagrams—IBM offers a choice of high-resolution color plotters.

All of our personal printers attach to IBM PCs, and many attach to other leading personal computers as well. They're all designed to serve a single purpose: To give everything you do the finishing touch.



Plotter graphics

For the authorized IBM dealer or the IBM Product Center nearest you—or for free literature—call 1 800 IBM-2468, Ext. 90/LR. Or contact your IBM marketing representative.

IBM Personal Printers...The Finishing Touch

NEW PRODUCTS/MICROCOMPUTERS

Continued from page 99
screen. It costs \$895.

The Ultragraph 800 card emulates an IBM Color Graphics Adapter. It costs \$995.

Microvitec, 1943 Providence Court, Airport Perimeter Business Center, College Park, Ga. 30337.

Computer Friends, Inc. has announced **Proteus**, a parallel double buffer and data switch.

Proteus is said to incorporate a buffer on each of the two output ports; a data switch, either via front panel, manual control or via software; and multiple-copy capability on both ports. It is said to allocate as much memory as is available at any one time to each output port.

Proteus costs \$199 for the 64K-

byte version and \$299 for the 256K-byte version.

Computer Friends, 6415 S.W. Canyon Court, Portland, Ore. 97221.

CIE Systems, Inc. has introduced the **CIE 7102**, a version of its **CIE 7100** terminal designed specifically for IBM Personal Computer, Personal Computer XT and AT multiuser conversions.

The terminal is said to use an emulation of the Personal Computer AT keyboard layout to appear functionally identical to an IBM PC running under IBM PC-DOS, with the addition of 24 function keys and a separate cursor control pad.

The terminal features a 14-in. screen in green or amber. Standard format is 25 lines by 80 or 132 col. It

supports both RS-232C and RS-422 interfaces.

The **CIE 7102** costs \$795.

CIE Systems, 2515 McCabe Way, Irvine, Calif. 92714.

Esprit Systems, Inc. has announced the **Aterm**, a fully compatible IBM Personal Computer AT terminal.

The **Aterm** was designed for multiuser environments. It combines an AT-identical keyboard with a VDT featuring a 14-in. screen with a green or amber display.

The **Aterm** emulates the Applied Digital Data Systems, Inc. Viewpoint and Regent 25, the Lear Siegler, Inc. ADM3A and the Esprit II/Hazeltine protocol.

The **Aterm** is priced at \$479.

Esprit Systems, 100 Marcus Drive, Melville, N.Y. 11747.

Axonix Corp. has announced the **Thin E/L Electroluminescent Backlight** system said to be able to be retrofitted to LCD portable computers.

According to the vendor, the **Thin E/L** allows the display to be read in any lighting condition including total darkness. The installation is performed at the Axonix factory. The retrofit consists of a thin-film E/L panel that is attached to the existing LCD display, control electronics and, if necessary, conversion of the laptop's battery back to rechargeable Nicads.

Prices range from \$200 to \$350 depending on the computer model.

Axonix, 417 Wakara Way, Salt Lake City, Utah 84108.

ITT Corp.'s Business and Consumer Communications Division has announced a line of **four printers** designed to meet user need for attached peripheral devices and for shared resources.

The printers are part of the **ITT System 3100** voice/data private automatic branch exchange product line.

The four printers are the **ITT 182** dot matrix personal printer; the **ITT 192** dot matrix; the **ITT 193** wide carriage and the **ITT Qume Letterpro 20**. Prices are \$399, \$599, \$750 and \$649, respectively.

ITT, 6131 Falls of the Neuse Road, Raleigh, N.C. 27609.

New Media Graphics Corp. has announced the **TS-2012** monitor for use with its PC-Graphover system.

The 12-in. color monitor is said to offer a fully integrated touch screen. It displays red-green-blue analog signals and is capable of screen resolutions of 640 by 400 pixels.

The **TS-2012** is priced at \$1,690.

New Media Graphics, 279 Cambridge St., Burlington, Mass. 01803.

Menlo Business Systems, Inc. has announced **Mac Menlo**, a software product said to allow the Apple Computer, Inc. Macintosh to be used as a Tandem Computers, Inc. terminal or a Lear Siegler, Inc. ADM2 terminal.

Mac Menlo includes facilities to transfer text and graphics to and from the host computer and allows users to record on-line sessions as Macintosh documents.

It costs \$395 per terminal.

Menlo Business Systems, 334 State St., Los Altos, Calif. 94022.

Tab Products Co. has introduced the **Systems-Plus**, a microcomputer designed to increase the intelligence of the Tab family of terminals and Digital Equipment Corp. VT100 and VT220 terminals and clones.

The **Systems-Plus** will run IBM Personal Computer XT programs. The terminals function as the keyboard and the monitor of the microcomputer as well as the terminal on the existing network.

Prices start at \$1,195.

Tab Products, 1400 Page Mill Road, Palo Alto, Calif. 94304.

ALL IN ONE.



Introducing the Freedom ONE from Liberty Electronics

The Freedom ONE is the one terminal for all of your ASCII needs. With the Freedom ONE you don't pay more for advanced features. With the Freedom ONE you don't sacrifice features just because you pay less. At \$449 the Freedom ONE gives you the best of all worlds—in one terminal.

The Freedom ONE is designed to be there with all the features you need whatever your application. A 14-inch flat screen gives you the ultimate in crisp, clear characters in either 80 or 132 column display formats. Popular emulations like Freedom 200, WY-50, Viewpoint A2, TeleVideo 950, and ADM 31 let you fully utilize all

your existing applications programs. An adjustable height keyboard with 44 easy to program keys (88 with shift) lets you tailor the key layout and functions to your liking. Compact and attractive styling gives your workspace a state-of-the-art look with room to spare. These are just a few of the no-compromise, unbeatable features you get standard with the Freedom ONE.

For more information call Liberty Electronics today (415) 543-4353, and ask for it all. Ask for the ONE.

Liberty
We Make Terminals

Freedom is a registered trademark of Liberty Electronics. WY-50 is a trademark of Wyse Technology. ADM is a trademark of Lear Siegler, Inc. Viewpoint is a trademark of Applied Digital Data Systems, Inc. TeleVideo 950 is a trademark of TeleVideo Systems, Inc.

NEW PRODUCTS/MICROCOMPUTERS

Bren Instruments, Inc. has announced the **82BC series** of multi-format label design, store and print systems.

The 82BC series uses a portable lap computer with built-in, read-only memory software for label create and store. It has a print control program that allows the printing of one label on demand or batch printing.

The systems offer speeds from 160 to 350 char./sec., 10 standard bar codes and 15 character heights.

Complete systems range in price from \$2,400 to \$5,000.

Bren Instruments, 308 Century Court, Franklin, Tenn. 37064.

Amdek Corp. has announced its **Color 730** analog red-green-blue color monitor, which is said to be compatible with the IBM Professional Graphics Adapter.

The monitor can display 256 colors at a time, selected from a palette of 4,096. It has a nonglare etched-glass CRT with up to 720 by 480 pixel resolution.

The Amdek Color 730 is priced at \$1,099.

Amdek, 2201 Lively Blvd., Elk Grove Village, Ill. 60007.

Graftel, Inc. has introduced the **VP 210**, a color video processor said to process graphics from a computer screen in 64 colors.

The Graftel processor is said to transfer the entire display to almost

any color printer or plotter through the use of built-in firmware.

The VP 210 features a 1M-byte or 2M-byte buffer and a 60 MHz data rate. It can accept graphics from screens with resolutions up to 1,280 by 1,040 pixels.

The VP 210 costs \$2,995 for the IBM-compatible model and \$3,495 for the 2M-byte version.

Graftel, 400 Executive Blvd., Executive Park, Elmsford, N.Y. 10523.

Okidata Corp. has announced two dot matrix printers, the **Microline 292** and the **wide-carriage Microline 293**.

According to the vendor, both printers are rated at 200 char./sec. in utility mode and single-pass 100 char./sec. in near-letter-quality mode. They operate with IBM and IBM-compatible personal computers.

The Microline 292 is priced at \$699, and the wide-carriage Microline 293 is priced at \$899.

Okidata, 111 Gaither Drive, Mount Laurel, N.J. 08054.

Recognition Technology, Inc. has announced the **RTIstation**, an intelligent vision subsystem for the IBM Personal Computer family.

The RTIstation is a hardware and software front end for all vision steps including image acquisition, image storage and image processing.

The system is composed of three hardware components: the PX-501M,

a 16-bit fixed-point pixel processor; a module for digitizing the incoming video output; and a module for image storage.

The RTIstation is priced from \$14,500 to \$20,000.

Recognition Technology, 335 Fiske St., Holliston, Mass. 01746.

Computone Systems, Inc. has announced **Ramvantage**, a semiconductor-disk capability for the IBM Personal Computer AT and compatibles running Santa Cruz Operations, Inc.'s System V or IBM System 3 Xenix.

Each Ramvantage board uses a slot in the IBM PC AT bus and provides 3M bytes of random-access memory disk capability. According to the company, up to four Ramvantage cards may be installed to provide up to 12M bytes of storage.

Ramvantage is priced at \$1,195.

Computone Systems, Suite 200, 1 Dunwoody Park, Atlanta, Ga. 30338.

Auxiliary equipment

Inmac has announced the **Easy-Access Buffer** printer buffer and the **Power Director**.

The Easy-Access Buffer was designed to allow access to a computer during printing. Both serial and parallel versions store up to 64K bytes of text. Memory can be expanded to 256K bytes.

Up to five components can be plugged into the Power Director. Each component can be powered up, or a master switch can power up the

whole system. Four versions are available: with storage slot; with three-device, 25-line T-switch; with three-device, 36-line T-switch; and with 64K-byte print saver.

The Easy-Access Buffer costs \$369. The Power Directors range from \$169 to \$429.

Inmac, 2465 Augustine Drive, Santa Clara, Calif. 95054.

COMMUNICATIONS

Controllers

Astrocom Corp. has announced the **Astrocom Easy II Manager**, a device for operator-controlled switching of data on IBM 3270 systems.

The Manager allows 3270 Class A terminal operators to have access to up to three IBM 3274 controllers on a session basis. It is used in conjunction with Astrocom's Squeezplexer coaxial multiplexer products.

Features include balancing of controller loading, providing controller access on a contention basis, expanding of a system without recabling and access to multiple computer systems via local or remote controllers.

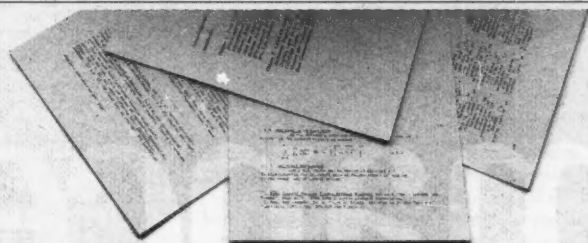
The Easy II Manager is priced from \$3,415.

Astrocom, 120 W. Plato Blvd., St. Paul, Minn. 55107.

Voice/data communications

Equatorial Communications Co. has introduced **Private Newswire**, which is a message generation and

Continued on page 106



It's simply
the most
sophisticated
word processing...

Most word processing systems come one way. Take it or leave it.

But WordMARC™ comes as sophisticated and powerful as you could ask for in its Composer™ version. Or as simple as word processing can get in its Author™ version.

Composer is perfect for preparing and editing long, complex documents, with automatic functions perfected for large companies, the legal, engineering and scientific professions.

It will automatically create a table of contents, index, number paragraphs and sections. It will

automatically float footnotes. It will create multiple levels of super and subscripts. And Composer provides the industry's most capable list processing.

It will merge documents for editing and printing from various users. And it will display your final document on the screen exactly as it will appear in print.

Compatible with most minis, micros and every IBM® PC, Composer does it all, and makes it all so easy with continuous, on-line help in plain English.

Now, let's move to the next page and look at Author, the executive's word processor.



...or the most
simple.

WordMARC™ Author™ is for people who couldn't care less about the technical side of word processing, but do care about putting their ideas simply and quickly into letters, memos and reports. It's an executive's dream.

If you know how to type, even just hunt and peck, you can use Author.

And for changing sentences around or rearranging paragraphs, you get continuous help in plain English displayed right on the screen. You never have to memorize commands or study a book.

Then, what you've written with Author can be accessed

through WordMARC Composer™ by the word processing professional for editing, merging with other documents if desired, creating indexes, a table of contents, and printing. And because both Author and Composer are totally compatible, you may even transfer Author files created on a PC to Composer operating on a mini-computer. What could be easier?

To learn more about WordMARC Author and Composer, just write or call. MARC Software, 260 Sheridan Avenue, Suite 200, Palo Alto, CA 94306. Call toll free 1-800-831-2400. In California, 1-800-437-9900.

WordMARC The Uncommon Denominator

WordMARC, Author and Composer are trademarks of MARC Software International, Inc. IBM is a registered trademark of International Business Machines Corp. ©1986 MSI, Inc.

Talk
is Cheap.

It's
Performance
That
Counts.

Today's system software buying decisions will affect your company for years to come.

Before you select a vendor, talk to people you can trust.

If you're about to invest in system software for your mainframe, here's some free advice that may surprise you:

Go slow.

The decision you're making will be felt for years to come throughout your entire organization. So don't try to short-cut the selection process.

And in particular, don't make a decision without talking to people with first-hand experience—the users of the products in question.

Naturally, we believe that Software AG products offer the best solutions available to the problems you face. And we'd like to have an opportunity to convince you—not by competitive claims and counterclaims, but by demonstrated performance in real-world customer sites.

In the meantime, we'd like to offer a few thoughts on some factors that contribute to performance.

Needed: integrated, long-term, worldwide solutions.

If you've been involved in data processing for any length of time, you already know more than enough about the dangers of piecemeal "quick fixes". You don't have to be sold on the value of integrated tools that meet a full range of organizational needs through a common language and shared procedures.

But while many vendors preach integration, few practice it on the scale of Software AG. From our core products, ADABAS and NATURAL, we have created an entire universe of software products that simultaneously meet the needs of everyone from MIS professionals to end users with no computer experience.

We're also integrated in another way—geographically. As more and more organizations seek to coordinate resources and data on a worldwide basis, they need a caliber of support that is consistent worldwide. Software AG's reach is unique among independent software vendors—with products installed in 52 countries.

Fourth-generation technology: Who needs it? Who's got it?

A lot of vendors have expended a lot of hot air on the subject of fourth generation languages. And we'd be the last to deny that a well-designed "4GL" can be a phenomenal productivity tool—as much as 10 to 20 times more productive than COBOL, for instance.

But if you want to see perfor-

mance in a fourth-generation system, not just a language, the list of contenders narrows way down. We suggest starting with any of the 400,000 programmers who've been using NATURAL since 1979.

It's the world's most widely installed, widely used fourth-generation language. NATURAL is far more than a language. It is a completely integrated environment that can handle from the complex to the simple using a common syntax.

Industry surveys repeatedly rate Software AG #1.

It's one thing for a vendor to be proud of its products. It's another for an entire industry to share in that high regard.

Yet for the last three years, that's just what happened. Each time the ballots have been counted in the annual *Datamation* survey, Software AG has come out #1 in product satisfaction. That's performance.

Software AG: high-performance vendor to over 2000 customers.

You could say that the reason we do so well in surveys is that they receive so many responses from our customers. And you'd be right.

Because system software is a long-term investment for most organizations, it inevitably carries with it a long-term relationship with the software vendor.

And for many years, we and our users have recognized the importance of that relationship. In fact, we have worked together to shape it in the interests of delivering the best possible product performance.

But while we're glad our users take the trouble to respond to surveys, we have no control over their comments.

Which makes it all the more gratifying to see the survey results. And all the more imperative that you hear what users have to say—before you buy.

Just give us a call today. Or send in the coupon. We'll be glad to put you in touch with Software AG users in situations comparable to yours, so you can find out for yourself what industry insiders have known all along:

Anyone can talk. But when it comes to performance, Software AG stands alone.

Call us at 1-800-336-3761.
(In Virginia and Canada, call 1-703-860-5050.)

I'm tired of talk.

Let me see some performance.

CW0421

Name _____

Title _____

Company _____

Address _____

City _____ State _____

Zip _____ Phone _____

Hardware _____ Software _____

SOFTWARE AG

11800 Sunrise Valley Drive, Reston, VA 22091

NEW PRODUCTS/COMMUNICATIONS

Continued from page 103
delivery system.

The system allows users to originate text and graphics from an IBM Personal Computer and distribute it to multiple sites instantly via satellite.

It incorporates Equatorial's C-120 series Micro Earth Station, a unit consisting of an indoor digital receiver/controller and an antenna. It uses PCC/Systems, Inc.'s CC: Mail electronic mail package.

The software costs \$295 per copy; C-120 Micro Earth Station costs \$3,350, or can be rented for \$130/mo. Transmission fee is \$25/mo per unit for networks with 100 or more locations and \$35/mo per unit for networks with fewer than 100 sites.

Equatorial Communications, 189 N. Bernardo Ave., Mountain View, Calif. 94043.

Denniston & Denniston, Inc. has introduced the **Voice Operated Interface System (VOIS)**, a tool kit said to enable users to build voice- or phone-activated applications.

VOIS was designed for use with Texas Instruments, Inc.'s TI-Speech technology. It is a configurable product and allows end users to interact with a computer data base by voice, using a headset or a phone. It can be programmed to deliver phone messages. When used with a TI Business-Pro computer, it can operate seven simultaneous phone lines. It also has a call-forwarding function.

VOIS includes the runtime programming software, which costs \$4,995, and the utility set, which costs \$1,995.

Denniston & Denniston, 3435 N. Kennicott Ave., Arlington Heights, Ill. 60004.

Software

Menlo Business Systems, Inc. has announced **Menlo Mail**, an electronic mail application for Tandem Computers, Inc. Pathway environments.

Menlo Mail is said to provide for messages of up to 99 screen pages. It provides broadcasting features to dynamically defined users groups and allows for the definition of user aliases.

Users are automatically notified of unreviewed messages and can preroute mail to other users.

Menlo Mail provides on-line message and user directories, and each user has a personal electronic work file.

The product is licensed for \$10,000.

Menlo Business Systems, 334 State St., Los Altos, Calif. 94022.

Interlink Computer Sciences, Inc. has introduced the **3711S Gateways** for IBM/Digital Equipment Corp. communications.

The 3711S Gateway for MVS offers bidirectional file transfer/data access, translation of all data types and remote job entry interface, interprogram communications and bidirectional terminal emulation packages.

The 3711S Gateway for VM offers bidirectional file transfer/data access, translation of all data types, interprogram communications, an electronic mail bridge and a remote spooling communications subsystem gateway.

Both support IBM and DEC security packages. Pricing starts at \$40,000.

Interlink, 39055 Hastings St., Fremont, Calif. 94538.

Applied Data Research, Inc. has announced that **ADR/Email** now supports peer-to-peer communications through CICS support of LU6.2, part of IBM's Systems Network Architecture.

Release 2.1 allows users to transmit messages across systems with several interconnected CPUs. It also allows users to transmit and receive messages through a telex network directly from their terminals.

Other new features include wide-screen support for creation and display of messages up to 220 characters wide, left and right scrolling commands and a print option allowing selective printing.

ADR/Email is available for IBM mainframes running under CICS or ADR/Roscoe. It costs \$45,100 for OS environments and \$22,400 for DOS environments.

ADR, CN-8, Rt. 206 & Orchard Road, Princeton, N.J. 08540.

Multiplexers/modems

Gandalf Data, Inc. has enhanced its **Switchmux** networking and switching multiplexer.

The enhancement consists of a new software release said to increase the unit's interconnection capability from 48 devices in a three-node network to 64 devices in a four-node network. It enables Switchmux to multiplex data from a variety of devices that use bit-oriented synchronous protocols such as IBM Systems Network Architecture terminals or CCITT X.25 packet assembler/disassemblers.

The enhanced software is being shipped with all Switchmux units. It costs \$125.

Gandalf, 1020 S. Noel, Wheeling, Ill. 60090.

Gandalf Data, Inc. has introduced the **LDS 120A**, **MLDS 123** and **LDS 2123**, asynchronous local modems for its Pacnet data networking family.

All three are said to offer 19.2K bit/sec. data transmission over privately owned, twisted-pair lines at distances from one to two miles.

The LDS 120A is a compact stand-alone model priced at \$300. The palm-size MLDS costs \$105 and plugs into terminal equipment. The LDS 2123 is a rack-mounted plug-in local modem module for the Pacx 2000.

Gandalf Data, 1020 S. Noel, Wheeling, Ill. 60090.

Training that fits. To the letter.

As the leader in MVS training, we know an inflexible curriculum isn't the answer in today's XA environments. That's why ASI gives you a way to fit the right course with the student and the training need. It's called the Curriculum Placement Facility. And you'll probably call it the most cost-efficient way ever devised to select and deliver XA training. That's especially important since, with ASI, you'll be choosing from the widest selection of XA courses in the industry.

But maybe XA isn't the issue. In that case, we should remind you that ASI's choice of SP courses and subjects is unsurpassed. In either case, you'll find ASI courses are delivered using the best medium for the message, whether it's video, CBT, live instructor or the real-world simulation of our exclusive interactive video instruction.

With our Curriculum Placement Facility, complete selection of XA and SP

courses and choice of delivery systems, we cover MVS training from A to Z. Give us a call and find out how ASI can fit your needs to the letter. And why that spells results.

ASI

You can rely on ASI for all your training needs.

NEW PRODUCTS/COMMUNICATIONS

Artel Communications Corp. has announced the Slimline 3270 Multiplexer series.

The Slimline Multiplexer connects from eight to 32 IBM 3270 Class A devices to a terminal multiplexer. An IBM 3274 controller connects to up to 32 ports to a Slimline Controller multiplexer. The multiplexers transfer data on a RG-62-AU coaxial cable.

Artel Slimline Multiplexers can be used in point-to-point, multidrop or star combinations. One 32-port controller Slimline can communicate with up to four terminal Slimlines.

The Artel Slimline Multiplexer 32-channel model is priced at about \$2,000.

Artel, P.O. Box 100, W. Side Station, Worcester, Mass. 01602.

Universal Data Systems has announced the 3270A protocol adapter and the TDM-56 multiplexer.

The 3270A, when combined with an asynchronous ASCII terminal, can substitute for an IBM 3270 controller and display.

The TDM-56 is a six-channel time division multiplexer designed for use on the Digital Data Service network. It features an aggregate bit rate of 56K bit/sec., asynchronous or synchronous subrates and channel speeds from 2,400 to 19.2K bit/sec.

The 3270A costs \$695, and the TDM-56 costs \$1,995.

Universal Data Systems, 5000 Bradford Drive, Huntsville, Ala. 35805.

Anderson Jacobson, Inc. has added the AJ 9601-M and the AJ 9601-MD to its line of 9.6K bit/sec. leased-line modems.

Both were designed for either point-to-point or multipoint operation and are compatible with the CCITT V.29 standard. They offer full-duplex synchronous operation at 9.6K bit/sec. over four-wire, unconditioned dedicated lines.

Fallback speeds of 7.2K and 4.8K bit/sec. can be selected, according to the vendor.

Other features include programmable options such as downline loading, internal security switches and a range of standard diagnostic tests.

In addition, the AJ 9601-MD offers automatic dial backup.

The AJ 9601-M costs \$1,695, and the AJ 9601-MD costs \$1,995.

Anderson Jacobson, 521 Charcot Ave., San Jose, Calif. 95131.

Anderson Jacobson, Inc. has introduced the AJ 9601-F 9.6K bit/sec. fast-poll modem for point-to-point or multipoint operation.

The modem is CCITT V.29 compatible and provides full-duplex synchronous operation at 9.6K bit/sec. over four-wire, unconditioned leased lines.

The AJ 9601-F features an automatic adaptive equalizer, advanced diagnostics, programmable options and numeric signal quality display.

It also has the ability to read the received signal quality level of individual remote modems. Multipoint network operation is software selectable.

The AJ 9601-F is priced at \$2,095.

Anderson Jacobson, 521 Charcot Ave., San Jose, Calif. 95131.

Inmac has introduced the Mux 2000, Mod Mux 2000, Mux 10000 and Mod Mux 10000 multiplexers.

The Mux 2000s let users place as many as eight terminals up to 2,000 ft from the host. Mux 10000s will transmit data signals as far as 10,000 ft.

They come with modular hookup. Instead of RS-232 cables, they use snap-in RJ-11 connectors. Mod Mux 2000 and Mod Mux 10000 are compatible and interchangeable with RS-232 versions.

All eight channels on every multiplexer transmit and receive data asynchronously. Speeds range up to 9.6K bit/sec.

The Mux 2000 and the Mod Mux 2000 cost \$395. The Mux 10000 and the Mod Mux 10000 cost \$595.

Inmac, 2465 Augustine Drive, Santa Clara, Calif. 95054.

Local-area networks

L/F Technologies has announced L/F-Net, a local-area network for its line of 8- and 16-bit multiuser computers.

L/F-Net is said to link multiple L/F Technologies computers and IBM Personal Computers and compatibles to an L/F Technologies multiprocessor system. It transfers data at 1M bit/sec. and features linear bus topology, twisted-pair cabling and a polling utility that prevents data from being lost between nodes.

The network will connect up to 16 workstations per controller. The cost is \$499 per node, which includes a PC half-slot serial card, an interface board and a network software program.

L/F Technologies, 2800 Lockheed Way, Carson City, Nev. 89701.

Network services

Gandalf Data, Inc. has added the Pacxnet link module, enhanced management control software and mass termination cabling options to its software-based distributed Pacx 2000 data networking systems.

The Pacxnet link module consists of several interface cards that allow the logic of Pacx 2000 to be accessed by earlier systems. It costs \$2,500. The enhanced software provides system management control capabilities including the capacity to store multiple system configurations, comprehensive usage statistics and third-party call setup for printer sharing. It costs \$1,000.

There are six mass termination cabling options: direct-connect cables to Switchmux, fan-out cables, punch

Continued on page 108

RUN THE 8600 UNDER \$2.75

THE BIGGEST PRICE PERFORMANCE BREAKTHROUGH IN MEMORY.

The incredible new Nemonix™ 16MB memory board is out to break a few records. For starters, it's priced at only \$44,995, or about \$2.74 per KB. You'll have to pay our competition more than twice that price for the same amount of memory. With Nemonix you save up to 50% on memory costs right from the start.

35% FASTER THAN OTHERS.

Now that we've saved you money, we're going to save you time

(and time is money, after all). We designed our new 16MB board to burn up the track by running 35% faster than our competitor's 16MB board. That means your VAX 8600 or 8650 can perform 8 hours work in as little as 5½ hours in a typical application. How do we do it? With a unique combination of high-speed ECL logic and high-speed TTL logic, that's how.

GUARANTEED PERFORMANCE. GUARANTEED FOR LIFE.

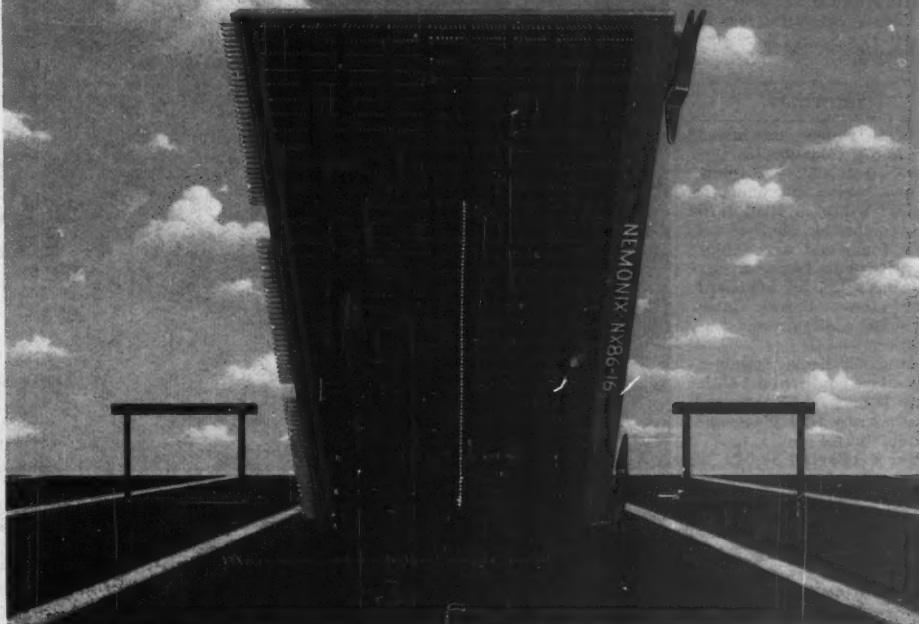
Our new 16MB board is so reliable we guarantee it for the life of your computer. On top of that we give

you a self-diagnostic program, 24-hour turnaround on service, and a free, no-risk trial. If you like our board, buy it. If you don't, we'll take it back with no ifs, ands or buts. And that goes for every other member of our growing line of memory products.

Find out more about our new 16MB board and what it can do for your track-record. Call Nemonix now at 800-435-8650 for complete information. In MA, 617-435-9087. Nemonix, Inc., Hopkinton, MA 01748

Nemonix

The name to remember.
See us at Duxco South
Booth 410.



NEW PRODUCTS/COMMUNICATIONS

Continued from page 107

blocks, bix blocks, modular splitters for RJ-11 plug-in terminations and unterminated cables for custom applications.

Gandalf Data, 1020 S. Noel, Wheeling, Ill. 60090.

Inmac has announced the Multi-Purpose Line Driver.

The line driver is said to allow terminals to be up to 10 miles from the CPU and will transmit at 2,400 bit/sec. If the terminals are within six miles, data will be sent and received at 9.6K bit/sec. At distances up to one mile, transmission speed is 19.2K bit/sec.

The line drivers are compatible with synchronous, asynchronous and isochronous equipment and with RS-232 terminals and peripherals.

The Multi-Purpose Line Driver is priced at \$475.

Inmac, 2465 Augustine Drive, Santa Clara, Calif. 95054.

SYSTEMS & PERIPHERALS

Processors

Preston Scientific has announced the Sdac16 D/A digital-to-analog conversion system for multichannel data systems.

The system features 16-bit resolution, dual rank input registers and 500 KHz input data update rate.

Data distribution to the first rank storage registers may be transferred at speeds up to 1 MHz.

Up to 32 Sdac16 converters may be installed in a rack-mounted chassis.

A typical 32-channel system is priced at \$27,000.

Preston Scientific, 805 E. Cerritos Ave., Anaheim, Calif. 92806.

Terminals

Term-Tronics has added the M-179 color display terminal to its IBM 3270 plug-compatible line of products.

The M-179 is IBM 3179 plug-compatible and offers both four- and seven-color capacity on its 14-in. screen.

It has a 122-key keyboard that allows downloadable keyboard configuration controls.

The color display terminal may be configured with Term-Tronics' 3274 control units or any IBM plug-compatible controller.

The M-179 costs \$2,099.

Term-Tronics, 4990 Viewridge Ave., San Diego, Calif. 92123.

Vidco, Inc.'s Covid has announced its Model 460 video interface for the IBM Enhanced Graphics Adapter

and other color computers and terminals.

The interface is said to provide quality output, allowing the user to connect a CRT to specialized data projectors or special large-screen monitors for display.

The 460 will convert transistor-transistor logic-level signals from the computer into analog RS-170-type video signals.

The Model 460 costs \$450.

Vidco, No. 4, 2400 W. 10th Place, Tempe, Ariz. 85281.

Printers/plotters

Infoscribe, Inc. has introduced the Model 1100T, a Tempest version of its Model 1100 serial dot matrix computer printer said to meet Nacsim 5100A specification for shielded operation.

The Model 1100T offers print speeds of 200 char./sec. for draft-quality printing, 100 char./sec. for correspondence-quality printing and 40 char./sec. near-letter-quality printing.

The Model 1100T printer costs \$2,980.

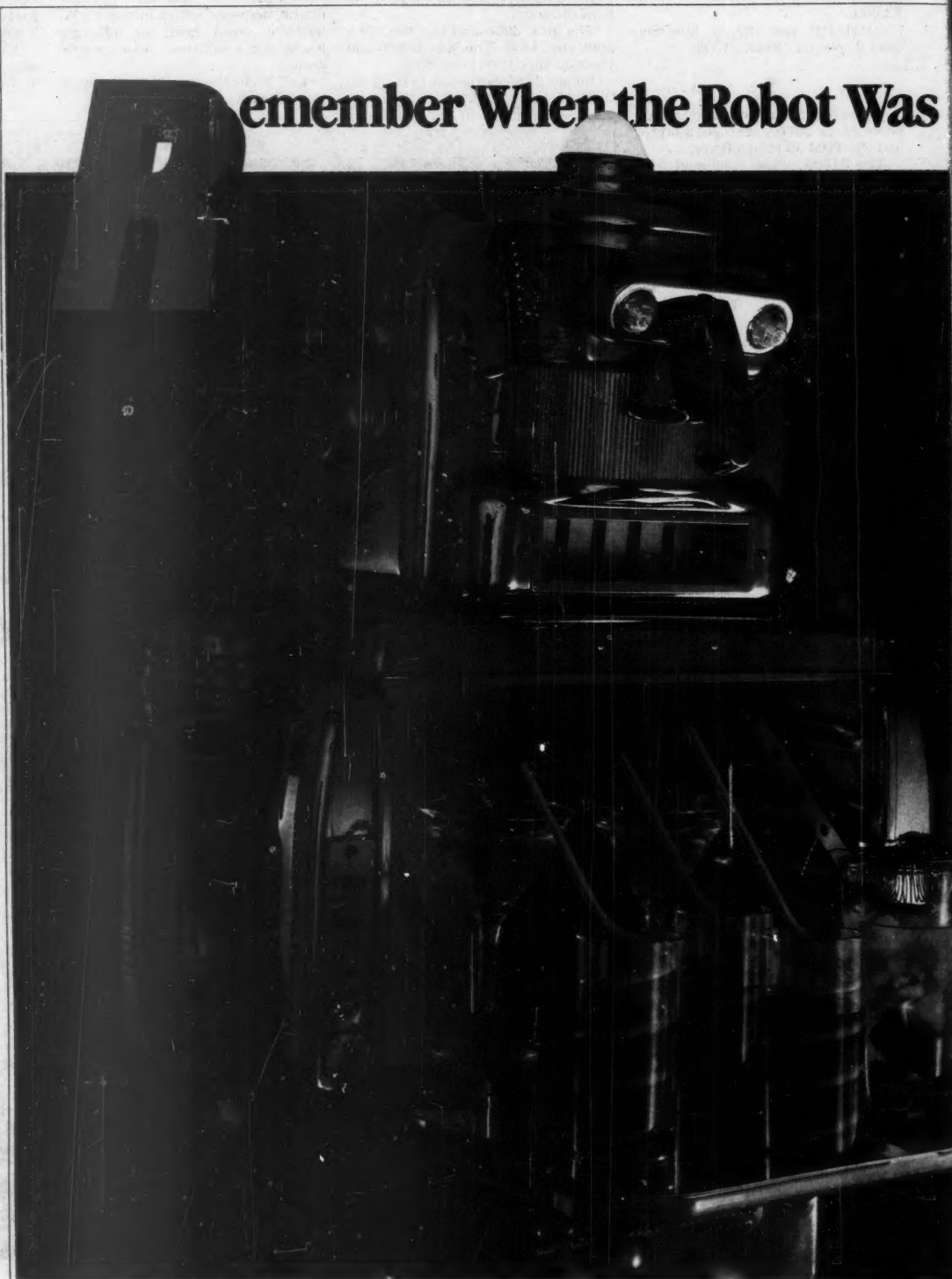
Infoscribe, 1808 Michael Faraday Court, Reston, Va. 22090.

Spur Products Corp. has announced the USA/Burroughs Universal Subsystem Adapter designed to allow any Burroughs Corp. A or V series computer to drive a selection of high-speed impact or laser printers or micrographics processors.

The adapter is said to make the Burroughs computers compatible with the IBM 3211 printer or any compatible; Xerox Corp. 8700 and 9700 laser printers; and Bell & Howell Co., Datagraphix, Inc., Eastman Kodak Co. or NCR Corp. 5300 microfilm and microfiche processors.

The Universal Subsystem Adapter costs \$7,500.

Spur Products, 13469 Beach Ave., Marina Del Rey, Calif. 90292.



Remember When the Robot Was

NEWS



CALENDAR

WEEK OF APRIL 27

APRIL 27-29, MONTE-REY, CALIF. — **Document-Based Optical Mass Memories.** Contact: Institute for Graphic Communication, 375 Commonwealth Ave., Boston, Mass. 02115.

Mass. 02115.

APRIL 28-29, MILWAUKEE — **Uninterruptible Power Systems: Design, Selection and Specification.** Contact: John T. Snedeker, Center for Continuing Engineering Education, University of Wisconsin-Milwaukee, 929 N. Sixth St., Milwaukee, Wis. 53203.

APRIL 28-30, ALBUQUERQUE, N.M. — **Integrated Fiber-Optic Technology Training.** Contact: Linda Castle, Optoelectronic Sys-

tem Consultants, P.O. Box 35525, Albuquerque, N.M. 87176. Also being held June 23-25 in Albuquerque.

APRIL 28-30, AVIGNON, FRANCE — **Sixth International Workshop on Expert Systems and Their Applications.** Contact: Jean-Claude Rault, Agence de l'Informatique, Tour Flat — Cedex 16, 92084 Paris — La Defense, France.

APRIL 28-MAY 2, RENO, NEV. — **Use, Inc. Spring Computer Conference.** Con-

tact: Use, Inc., Box 461, Bladensburg, Md. 20710.

APRIL 28 to MAY 2, VANCOUVER, B.C. — **Congress '86 — Annual Conference of the Canadian Information Processing Society.** Contact: Sunny L. Kae, Congress Chairman, P.O. Box 86279, North Vancouver, B.C. V7L 4J8.

MAY 1-2, TEMPE, ARIZ. — **Logic Programming and Its Applications In Expert Systems.** Contact: Center for Professional Development,

College of Engineering and Applied Sciences, Arizona State University, Tempe, Ariz. 85287.

WEEK OF MAY 4

MAY 5-7, GENEVA — **Second World Congress of Production and Inventory Control.** Contact: World Congress Secretariat-2F, 500 W. Annandale Road, Falls Church, Va. 22046.

May 5-7, WASHINGTON, D.C. — **Twelfth Annual Federal DP & Communications Conference.** Contact: Linda M. Yogel, The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

MAY 5-7, WILLIAMSBURG, VA. — **AM/FM International Regional Conference On Automated Mapping/Facilities Management.** Contact: Barbara Emery, AM/FM International, No. 820, 8775 E. Orchard Road, Englewood, Colo. 80111.

MAY 5-9, NEW YORK — **Atlantic Systems Guild Modern Structured Design Workshop.** Contact: Palmer Consulting, 353 W. 12th St., New York, N.Y. 10014.

MAY 5-9, SAN FRANCISCO — **Harmon Associates Seminars and Workshops.** Contact: Harmon Associates, 151 Collingwood, San Francisco, Calif. 94114.

MAY 6-8, ATLANTA — **Local-Area Networks.** Contact: Trish Stolton, Department of Continuing Education, Georgia Institute of Technology, Atlanta, Ga. 30332.

MAY 7-9, SCOTTSDALE, ARIZ. — **Managing and Motivating For Improved Productivity.** Contact: Marilyn S. Bodeck, Data Entry Management Association, P.O. Box 16711, Stamford, Conn. 06905.

WEEK OF MAY 11

MAY 11-14, NEW ORLEANS — **Association for Systems Management Annual Conference.** Contact: Richard B. McCaffrey, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

WEEK OF MAY 18

MAY 19-21, HILTON HEAD, S.C. — **Audit Managers Symposium VII.** Contact: MIS Training Institute, Inc., 4 Brewster Road, Framingham, Mass. 01701.

MAY 19-21, SAN FRANCISCO — **Hammer Forum West: Change and Continuity in End-User Computing.** Contact: Michael Hammer, Hammer and Co., Hammer Forum West, Five Cambridge Center, Cambridge, Mass. 02142.

MAY 20-23, ORLANDO, FLA. — **Techex '86 America.** See CALENDAR page 112

Nothing More Than a Dumb Waiter.

To say the very least, what started as nothing more than a futuristic novelty act, tomorrow's conversation piece, is now a given, an important, productive piece of standard operating equipment for factory automation.

The robot has arrived.

Keeping in mind the robot's evolution into an accepted fact of manufacturing life, we'd like to introduce you to a service that will inevitably become a standard in maintaining complex voice and data communications systems.

Introducing Communications Service Assurance from PacTel Spectrum Services

A service some said was simply too good to be true.

A service every MIS director and telecommunications manager wanted but refused to believe in. "Wish list thinking," they said.

And wish list thinking is what we're offering.

Communications Service Assurance is a new concept, to be certain, and, just like the robot, will be met with its share of skepticism. That's OK. We're asking that you keep an open mind and read on.

Communications Service Assurance represents a single source for problem detection, diagnosis and preventive monitoring, as well as expediting restoration of your corporate communications. It helps with expansion and alteration and gives you customized services.

Communications Service Assurance packages the comprehensive solution for improving your system performance. You're

able to concentrate on strategic MIS responsibilities instead of playing catch-up and reacting to the hassle, headaches and hang-ups of day-to-day problems plaguing your system.

Communications Service Assurance can be applied to any equipment, any protocols, at any site.

It incorporates diagnostic hardware and software.

It delivers teams of experienced test engineers from diversified backgrounds.

It accesses a unique system inventory data base.

It involves an ongoing industry relations program.

Remember, this is a service. We sell no hardware, lease no lines and repair no equipment.

What we do sell is increased reliability, productivity, bottom line cost-effectiveness and any level of expertise available 24 hours a day (we never close).

We're a wish that's a reality. We're a service that will become as important and accepted as the robot.

Rest assured, Communications Service Assurance has arrived.

For further information, please call 800-446-4321. Or you can write directly, PacTel Spectrum Services, 100 Pringle Avenue, Suite 750, Walnut Creek, CA 94596, attention N. Floyd, Marketing Director

PAC * TEL
Spectrum Services

A Pacific Telesis Company

**"We should think seriously
about standardizing on
Cullinet software."**

**"They have the only
information system strategy
for the '80's and '90's that
makes sense."**



A large number of companies in the United States today are operating with information technology that is 10 to 15 years old. Utilizing the technologies available in the '60's and '70's, these companies either built or purchased applications from many different sources. These applications were difficult to integrate because they were simply not designed to work together.

The result has been a collection of systems that are unable to talk to each other, are difficult to maintain and are held together by the proverbial "baling wire."

Companies who recognized the need to respond quickly to changes within the business environment have been seeking a coherent information system strategy that will help them to succeed in today's highly competitive world.

That's why so many companies are relying on Cullinet's three-level integration—that brings together all of the information resources of an organization and makes accurate information available to senior management, delivering on the promise of computers, making information available in time to take corrective action.

Only Cullinet can provide the solution through its information strategies for the '80's and '90's.

Because IDMS/R, Cullinet's Integrated Database Management System is the Foundation for all Applications of the Future...

... it provides a completely integrated environment to support applications development. Database management systems exist to build better applications. Better applications require an integrated development system with optimized tools designed to work together to store, report and query data; to define, track and manage the use of data and programs; and to design, write and document the application. Only Cullinet's database management system, IDMS/R, with its completely integrated application development system can provide this kind of efficient data processing and a foundation for better business applications.

Because Cullinet's Fourth Generation Applications are Functionally Integrated, they Work Together...

... and are designed and developed on the same database foundation so that they can share data between applications and deliver the advanced application development tools to make packaged applications software into unique corporate solutions.

Cullinet's line of applications software delivers leading edge functionality in all areas. Our advanced manufacturing system is designed to provide multi-plant production and inventory control. Our integrated financial solutions assist in effectively managing all your financial activities. Our human resource management system integrates all your payroll and personnel functions into a single system. And our banking solution combines all major banking functions to provide comprehensive relationship banking capabilities. Each application is designed by industry professionals with a thorough understanding of your business requirements.

Because Cullinet's Information Center Management System provides Consistent and Simple Access to all Corporate Information...

... your managers can make effective business decisions based upon complete information. Your information residing on the mainframe, departmental minicomputer or information from personal computers such as documents, spreadsheets and graphs can be consolidated to provide a composite view of all your corporate activities. Cullinet's unique integration delivers the tools you need to create a complete corporate information system.

For example, for the manufacturer with the need to associate production data with sales orders and forecasts, or skills requirements with shop floor needs, or for the bank associating customer information with loan data, Cullinet's micro to mainframe integration allows you to deliver the appropriate data to a personal computer for analysis so that your managers can make effective business decisions for your company.

Only Cullinet's Complete Corporate Information Solution is based on Three-Level Integration...

... resulting in a comprehensive information system that delivers the tools you need to address today's critical business requirements, make decisions on the latest information and respond to the challenging environment of today and tomorrow. Only through the complete integration of **applications, information center and database** can you gain a lasting competitive advantage.

For more information about the only corporate information strategy for the '80's and '90's, call Cullinet's toll-free number 1-800-551-4555.

The Leader in Information Systems Software

Cullinet

© 1986 Cullinet Software, Inc., Westwood, MA 02090-2198

NEWS

CALENDAR from page 109

cas: The Annual World Fair for Technology Exchange. Contact: Anne E. Klenner, Dr. Dvorkovitz & Associates, P.O. Box 1748, Ormond Beach, Fla. 32075.

WEEK OF MAY 25

MAY 28-29, WASHINGTON, D.C. — **Systems/34, 36 and 38 Users Show.** Contact: Andrew Wahtera, The Producers, 360 Merrimack St., Lawrence, Mass. 01843.

MAY 29-30, SAN FRANCISCO — **Unix In Focus.** Contact: International Data Corp., Suite 201, 3350 W. Bayshore Road, Palo Alto, Calif. 94303.

MAY 29-31, BLACKSBURG, VA. — **Personal Computer Interfacing For Scientific Instrument Automa-**

tion. Contact: Linda Leffel, Virginia Polytechnic Institute and State University, Blacksburg, Va. 24061.

WEEK OF JUNE 1

JUNE 2-5, DETROIT — **Vision '86** — **Applied Machine Vision Conference and Exposition.** Contact: Vision '86 Public Relations, Machine Vision Association of the Society of Manufacturing Engineers, P.O. Box 930, One SME Drive, Dearborn, Mich. 48121.

JUNE 2-5, NASSAU BAY, TEXAS — **International Symposium on Ada Programming Language Applications for Space Station Development.** Contact: University of Houston — Clear Lake, 2700 Bay Area Blvd., Houston, Texas 77058.

JUNE 4-6, SAN DIEGO — 1986

National Educational Computing Conference. Contact: Susan M. Zgliczynski, National Educational Computing Conference 1986, School of Education, University of San Diego, Alcalá Park, San Diego, Calif. 92110.

WEEK OF JUNE 8

JUNE 7, BEIJING — **China-Didacta '86: The International Trade Fair for Educational Equipment.** Contact: Swiss Industries Fair, Secretariat China Didacta '86, P.O. Box CH-4021, Basel, Switzerland.

JUNE 9-13, SAN DIEGO — **MUMPS Users' Group 15th Annual Meeting.** Contact: MUMPS Users' Group, Suite 510, 4321 Hartwick Road, College Park, Md. 20740.

JUNE 10-13, ATLANTA — **Summer 1986 Unix Conference and Ex-**

hibition. Contact: The Usenix Association Conference Office, P.O. Box 385, Sunset Beach, Calif. 90742.

WEEK OF JUNE 15

JUNE 16-20, CAMBRIDGE, MASS. — **Managing Information Technology: New Responsibilities in a Changing Environment.** Contact: Center for Information Systems Research, Sloan School of Management, MIT, E40-193, 77 Massachusetts Ave., Cambridge, Mass. 02139.

JUNE 17-19, ATLANTIC CITY — **Plas-Tech '86.** Contact: Delia Associates, P.O. Box 338, Delia Marketing Communications Center, Whitehouse, N.J. 08888.

WEEK OF JUNE 22

JUNE 22-27, PHILADELPHIA — **Management Information Systems for Strategic Advantage.** Contact: The Registrar, 200 Vance Hall, Office of Executive Education, The Wharton School of the University of Pennsylvania, Philadelphia, Pa. 19104.

JUNE 23-27, AMSTERDAM — **Fourth Annual European Fiber-Optic Communications and Local-Area Networks Exposition.** Contact: Cheryl MacDonald, Information Gatekeepers, 214 Harvard Ave., Boston, Mass. 02134.

JUNE 23-27, CHICAGO — **A/E/C Systems '86: The Computer and Management Show for the Design and Construction Industry.** Contact: A/E/C Systems '86, P.O. Box 11318, Newton, Conn. 06111.

JUNE 25-26, COATESVILLE, PA. — **Chester County Expo '86: CAD/CAM Conference from Micro to Mini.** Contact: Lee Smith, Central Chester County Vocational Technical School, 1635 E. Lincoln Highway, Coatesville, Pa. 19320.

WEEK OF JULY 27

JULY 28-30, RENO, NEV. — **1986 Summer Computer Simulation Conference.** Contact: The Society for Computer Simulation, P.O. Box 17900, San Diego, Calif. 92117.

WEEK OF AUGUST 17

AUGUST 18-22, DALLAS — **Thirteenth Annual Conference on Computer Graphics and Interactive Techniques.** Contact: SIGGRAPH '86, Smith, Bucklin & Associates, Inc., 111 E. Wacker Drive, Chicago, Ill. 60601.

WEEK OF SEPT. 7

SEPTEMBER 9-12, ANTWERP, BELGIUM — **Second European Simulation Congress.** Contact: The Society for Computer Simulation, c/o Ghislain C. Vansteenkiste, Professor of Engineering, University of Ghent, Coupure Links 653, B-9000 Ghent, Belgium.

WEEK OF SEPT. 14

SEPTEMBER 18-19, MONTREAL — **Canadian Office Machine Dealers Association/Candex.** Contact: Roy Whitshed, Candex Conference, Inc., 47 Lakeshore Road E., Mississauga, Ont. L5G 4L7.

How to advertise in every major computer market in the world as easily as you advertise in the U.S.

CW INTERNATIONAL Marketing Services will help you penetrate the most profitable computer markets worldwide — easily, effectively, and economically.

Your ads will receive the attention they deserve. Our network of more than 55 computer publications in over 25 countries is the largest in existence. More than 9,000,000 computer-involved people around the world rely on us for the information they need to stay ahead.

With more than 10 years experience in international marketing, we're the only service of our kind. We can help you make your ads more effective. Our local offices can translate your ads for a 15% surcharge on the space you purchase.

And you'll be able to advertise in even more markets when you take advantage of our corporate discounts.

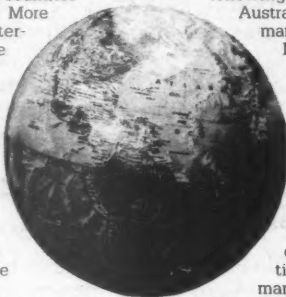
We're also available to advise you on your campaign strategy — such as when to advertise in order to coincide with special-focus issues and trade shows.

All you need to do is send us your advertising materials. We'll handle all the transactions. And we'll bill you in U.S. dollars so you won't have to worry about exchange rates.

We'll help you increase your market penetration. We have publications in all of the following countries:

Argentina, Australia, Asia, Brazil, Chile, Denmark, Finland, France, Greece, Hungary, India, Israel, Italy, Japan, South Korea, Mexico, Norway, People's Republic of China, South Africa, Spain, Sweden, Switzerland, The Netherlands, United Kingdom, Venezuela and West Germany.

Call Frank Cutitta. He'll be happy to send you rate cards for any of our publications or any of our series of market fact brochures on specific countries. You can reach him toll-free at (800) 343-6474. In Massachusetts call (617) 879-0700. Or you can reach him through Telex, at number 95-1153. Or, if you prefer, fill out the coupon below and return it today. Do it now. The sooner we hear from you, the sooner you'll hear from our readers.



Frank Cutitta
Managing Director
CW International Marketing Services
375 Cochituate Road, Box 880
Framingham, MA 01701
USA

- ☐ Please send me more information about your International Marketing Services.
☐ Please have a sales representative call me.

Name _____
Title _____
Company _____
Address _____
City _____ State _____ Zip _____
Telephone _____

COMPUTER INDUSTRY

Section begins on page 142

NEC to see Intel in court next week

Trial will decide if microcode is copyrightable

By Maura McEnaney

SAN JOSE, Calif. — After nearly two years of arguments and thousands of pages of legal documents, the long-standing battle over copyright infringement between chip makers Intel Corp. and NEC Corp. subsidiary NEC Electronics Corp. goes to court next week in a trial that will attempt to determine whether microcode is copyrightable.

Jury selection is scheduled to begin next Monday in U.S. District Court for Intel's suit against NEC Electronics over alleged copyright infringements on Intel's 8086 and 8088 microprocessors.

The suit stems from NEC's April 1984 introduction of the V series of microprocessors, considered to be supersets, or enhanced versions, of Intel's products.

NEC's product introduction set off a series of suits and countersuits between the

two companies over what constitutes infringement. The outcome of the case could have significant impact on semiconductor companies that now license manufacturing rights from other vendors in a process called second sourcing, industry observers say.

If the court rules the microcode is copyrightable,

77

The outcome of the case could have a significant impact on semiconductor firms that now license manufacturing rights from other vendors.

"There would be no second sourcing without a license," NEC attorney Bob Hinckley said.

"If the court says microcode is not protectable by copyright, that could have implications on programming at a higher level, such as in

the design and development of compatible operating systems," said Allen Grogan, an attorney with Blanc, Gilburne, Peters, Williams and Johnston, a Los Angeles firm specializing in computer law.

NEC fired the first shot in the case with a December 1984 suit against Intel responding to rumors that Intel planned to file suit against the Japanese company. That suit sought a ruling stating that Intel microcode is not copyrightable, that its copyrights are not valid and that NEC did not infringe on any Intel copyright.

Two months later, in February 1985, Intel fired back, alleging NEC infringed on its copyrights with the introduction of the V series of processors. NEC maintains, however, that the microcode, or set of instructions used in the microprocessor, is not copyrightable because it constitutes part of the computer and cannot be changed.

Judge William Ingram will preside over the case, which now applies to NEC's most recently announced 16-bit product line, the V40 and V50 series.

Intel taps four firms for 80386 compilers

By Maura McEnaney

SANTA CLARA, Calif. — Four systems software companies were recently tapped by Intel Corp. to develop language compilers for Intel's 80386 32-bit microprocessor.

Silicon Valley Software, Inc. of Cupertino, Calif., will develop Fortran, Pascal and C compilers for the 386 running the Unix System V operating system.

The compilers support functions that will allow source code to be transported between host systems.

The compilers will perform symbolic debugging and generate code for Intel's 80387 numerics coprocessor or Weitek Corp.'s 1167 floating-point chip set.

Language Processors, Inc. of Waltham, Mass., plans to develop Cobol, Fortran, C, Pascal, PL/I, RPG-II and Basic compilers for the 386.

The Language Processors compilers use a common optimizer with functions that allow users to select various levels of optimization to reduce program execution

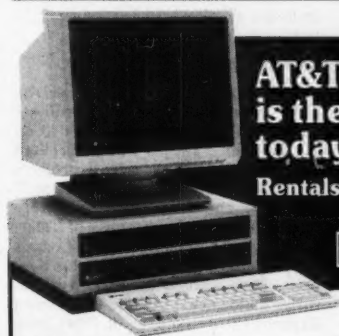
time. A polyglot programming capability is said to allow software developers to switch between languages within a single program.

In addition, Language Processors will offer an interactive source-level debugger with the 80386 compilers, which reportedly will permit program testing and debugging using source language symbols.

Ryan-McFarland Corp. of Rolling Hills Estates, Calif., has announced it will port its certified standard Fortran and Cobol compilers to the 386. The company's RM/Fortran implements the ANSI X3.9 1978 and performs local and global optimizations. RM/Cobol-SX is an ANSI X3.23 compiler.

Both products support mainframe extensions and symbolic debugging capabilities.

Also tapped by Intel was Green Hills Software, Inc. of Glendale, Calif. The company plans to develop Fortran, C and Pascal compilers for the Intel 386 microprocessor.



AT&T 6300PC PLUS
is the better choice for
today and tomorrow

Rentals and Leases available

Check it out at
MTI Systems

Powerful Intel 80286
Microprocessor, 6MHz.

Runs 25% faster than the IBM
PC/AT in various 512K RAM
configurations such as: 1.2 MB floppy
with 20 MB hard disk, and dual floppy
model with 1.2 MB and 360K floppies.
Supports 3 additional 2 MB RAM
expansion boards for a total of 7 MB
of RAM.

Serial and parallel ports.

Clock calendar.

Runs more MS-DOS applications
than are available for the IBM PC/AT.

Provides access to UNIX System
V and allows true integration of the
MS-DOS and UNIX operating systems.

MTI is the one source for all the
computer and data communications
equipment, applications expertise and
service you need. At great prices. Call
MTI and save.

MTI SYSTEMS CORP.
A SUBSIDIARY OF DUCOMM INCORPORATED
Computer & Data Communications Equipment
Sales / Leasing / Service / Systems Integration
Digital Equipment Corp., Intel, Texas Instruments, AT&T, Qume, HP,
Dataproducts, Diablo, Lear Siegler, Espirit, Wyse, C.I.E.
Racal-Vadic, MICOM, Develcon, Control Data, Emulex, NEC

New York:
212/226-2337
516/621-6200
518/449-5959
718/767-0677

Massachusetts:
617/932-3876
New Jersey:
201/227-5552

Pennsylvania:
412/931-9351
Illinois:
312/773-2300

California:
818/883-7633
714/220-6487
Ohio:
216/464-6688

Kentucky:
502/499-6656
OR CALL
800/645-6530

*Franchised areas only

MS-DOS is a trademark of Microsoft Corporation
IBM PC/AT is a trademark of International Business Machines Corporation
UNIX is a trademark of AT&T Laboratories

DOS, OS, or CICS Frustration?

BIM gets it out of your system.

BIM presents a line of proven programs that maximize your system's capabilities, saving you time, labor and expense. These program products help get the most out of your system and people.

BIMWINDOW — Multiple terminal sessions concurrently at CRT under DOS or OS VTAM.

BIM-EDIT — The editor with more than 25 significant features that ICCF can't match.

BIMSPPOOL — Prints output in POWER/VE spooling queue on local or remote 3270 terminal printers. (Received ICP Million Dollar Award 1982).

BIMSPPOOL — On-Line to Batch Print Spooling. Prints data passed from CICS application programs into the POWER spooling queue.

BIM-PDQ — POWER Dynamic Queuing performance enhancement. Eliminates 85% of the I/O to heavily used POWER queue.

BIM-ODS — Comprehensive problem analysis and display of operational CICS system. DOS and OS.

BIMTEXT — Word processing, document composition system. Create formatted documents from free-form input. DOS and OS.

BIMSWAP — Switch local 3270 BTAM terminals between multiple CICS partitions without special hardware or additional ports.

BIMCMPSRS — CICS 3270 data compression system. Reduces response time for remote terminals significantly. DOS and OS.

BIM-FMAP — CICS BMS on-line map generation and maintenance. DOS and OS.

BIMECHO — Copies one CRT's output to another or printer for problem determination and demonstration.

BIMP3270 — Comprehensive CRT screen image print facility. Copy to terminal printers or spool queue for system printer.

BIMSERV — On-line display of library directories and entries, VSAM Catalog entries, disk VTIOC's, etc.

BIMCONSOL — Multiple/Remote System Console function for CICS. Display-only or full input/display versions available.

BIMMONTR — DOS/VE System Status, Performance Measurement, and POWER Queue display.

BIMSBMT — On-line Job Edit and Submission facility.

BIM programs are cost-efficient, some less than \$300, highest \$4800. You can save even more with our group package offerings. Products are available on permanent, annual, or monthly licenses, and shipped on a 30-day free trial basis. Product documentation is available on request.

BIM also performs systems programming consulting, with consultants based in Minneapolis and Washington, D.C. Computer time services are also available on our 4331-2 system, on-site or remote.

BIM

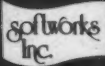
B I MOYLE ASSOCIATES, INC.
5788 Lincoln Drive
Minneapolis, MN 55436

612-933-2885
Telex 297 893 (BIM UR)

Member Independent Computer Consultants Assn.

FAST

**...BUT
VSAM-ASSIST
IS MUCH MORE!**



Softworks, Inc.
7700 Old Branch Avenue
Clinton, Maryland 20725
For information:
In U.S. call 1-800-638-9254
In Canada call (301) 856-1892

VSAM-ASSIST

**A High-Speed
Backup/Restore Facility
For VSAM Datasets
and Catalogs**

- High Speed Mass Backup to a Single Backup Dataset
- Selective Restore with Dataset Renaming
- Automatic DASD Space Computation/Adjustment
- Mass-Migrate Datasets and Catalogs from VSAM to ICF

COMPUTER INDUSTRY

Merger activity registers 1985 record of \$5 billion

Megadeals strike communications mart

By Alan Alper

FRENCHTOWN, N.J. — Spurred by an increasing number of so-called "megadeals," a record-setting \$5 billion dollars worth of mergers and acquisitions were transacted last year in the computer/communications industry, up 10% from the previous year, according to a study conducted by the Cerberus Group, Inc.

Megadeals, defined by transac-

tions carrying a price tag of \$50 million or more, numbered a record-breaking 22, compared with 12 in 1984, the report said. The aggregate value of these deals was \$3.5 million, accounting for approximately two-thirds of the total.

Because of cyclical factors, however, Cerberus Group Senior Partner Charles Varga said he believes that merger and acquisition activity will slow somewhat in 1986.

"We'll probably see at least 200 deals this year, not the almost 300 which occurred last year," Varga noted. "But I said the same thing in 1985 after a record-setting 1984 and was wrong. There was a record number of divestitures last year, and the economic recovery was not as strong as was projected."

Even though merger and acquisition activity this year is not expected to be as brisk as in 1985, Varga said, the dollar value of individual deals will continue to increase. Corporations are paying 50% more than they were a decade ago, he said, because of the pervasive effect information processing and communications technologies have on almost every facet of their business.

"At least 30% of the deals are done by companies outside the [computer/communications] industry," he noted. "Potential buyers perceive that such know-how is harder to replicate in-house at a lower price than it is to purchase."

'Buy mousetraps now'

"They'd rather buy a mousetrap now than spend an inordinate amount of time and resources to do it," he said. "They'd like to prevent the usual MIS story where projects are 50% late and 100% over budget."

Among the 1985 megadeals were Dow Jones & Co.'s purchase of Telerate and MCI Communications Corp.'s acquisition of Satellite Business Systems, both valued at \$460 million. Other major deals included American Express Co.'s takeover of First Data Resources, Ameritech's purchase of Applied Data Research, Inc. and the acquisition of Mohawk Data Sciences Corp. by two investor groups, Welsh, Carson, Anderson & Stowe and J.H. Whitney & Co.

A record number of 290 mergers and acquisitions were reported last year, up 13% from 1984, the report noted. Merger and acquisition activity reached a fevered pitch in the second and third quarters, with 82 and 83 deals consummated, respectively. The pace slowed dramatically in the fourth quarter, however, with only 49 deals reported.

"The fourth quarter historically has been a slow time for mergers and acquisitions," Varga said. "Momentum from the previous year usually carries into the first and second quarters as buyers race to look at companies. By the fourth quarter, things slow up."

Regarding possible megadeals this year, Varga is not expecting deals of the magnitude of General Motors Corp.'s acquisition of Electronic Data Systems Corp. "The only big one, Citicorp's proposed acquisition of Quotron Systems, Inc., seems to have fallen apart," he said.

WE COULDN'T BUILD BETTER PRINTERS FOR BIG-BLUE SYSTEMS IF WE WERE,



You-know-who may be big. But when you compare Printronix performance, features and speed, it's clear to see who's best. Printronix printers plug and print with virtually every system those guys build. From main-frame to mini to PC. They can't hide our lower cost, or cover up the fact that Printronix offers a broad range of printers with an even broader range of applications.

Band printers with a top speed of 2,000 LPM. State-of-the-art laser technology. High-resolution graphic printers. Even a family of industrial strength bar code printers and printer/plotters. An entire line that couldn't work harder if their name were you-know-what.

Printronix reliability is proven with hundreds of thousands of printers on the job. And we've got you covered

with service facilities in every major business center. Just like them.

If you're a Big-Blue system user, you made a smart decision. Now make a smarter decision in business printers. It'll make you-know-who look even better.

For more information mail in the coupon or call 800/535-3232.

The first line in printers.

PRINTRONIX

IBM is a registered trademark of International Business Machines Corporation.
Printronix is a registered trademark of Printronix, Inc.

PLEASE SEND ME MORE INFORMATION ON PRINTRONIX PRINTERS FOR MY IBM SYSTEM.

- ☐ 34, 36, 38 ☐ 3270 ☐ 4300 Series ☐ PC ☐ Other
☐ Please have a sales representative contact us.

Name: _____
Company: _____
Street: _____
City: _____ State: _____
Zip: _____ Tel: _____
Mail To: Printronix, Inc., P.O. Box 638
Langhorne, PA 19047, Phone 800/535-3232.

EXECUTIVE REPORTS

Special Editorial Features

Every issue of Computerworld presents either a Product Spotlight or Executive Report. For advertisers it's still not too late to take advantage of the hot topics set for May!

Disaster Recovery (Product Spotlight, May 12) How to create the master plan that should be in place in the event of DP-center disaster. Focus on procedures, assembling and training a recovery team, and defining critical applications. Also, features on evaluating the recovery site and the role of telecommunications. Spotlight chart lists disaster recovery site providers. Closing date April 25.

Electronic and Voice Mail (Executive Report, May 19) Users of state-of-the-art equipment talk about the problems and benefits of installing these systems. Focus on the "elusive" integrated electronic/voice mail system — is there such a system now, and who is driving its introduction (end user or MIS/DP)? Plus, value-added network services. Closing date May 2.

In-house Publishing (Executive Report, May 26) Focus on the MIS manager's role in corporate electronic publishing. From host-based systems to departmental networks and stand-alone desktop publishing systems. Looks at integration in host-based systems and the role of the IBM PC and Apple Macintosh. Closing date May 9.

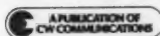
And here's what's scheduled for June and July:

ISSUE	TOPIC	CLOSING DATE
June 2	Word Processing Software (Product Spotlight)	May 16
June 16	The BUNCH Companies (Executive Report)	May 30
June 23	Personal Computer Graphics (Product Spotlight)	June 6
June 30	Integrated QA Systems (Executive Report)	June 13
July 7	Data Security (Executive Report)	June 20
July 14	Expert Systems (Product Spotlight)	June 27
July 21	PBX Networks (Executive Report)	July 3
July 28	Management Training for DP Executives (Executive Report)	July 11

Why not take advantage of these special opportunities to reach your customers? Executive Reports and Product Spotlights focus readers' attention — and that strengthens the power of your ads. Call Ed Marecki, Computerworld's Vice President/Sales at (617) 879-0700 — or call your local Computerworld representative — to reserve space for your ad today.

COMPUTERWORLD

Boston: (617) 879-0700 New York: (201) 967-1350
Atlanta: (404) 394-0758 Chicago: (312) 827-4433 Dallas: (214) 991-8366
San Francisco: (415) 421-7330 Los Angeles: (714) 261-1230



PRODUCT SPOTLIGHTS

LaserTEN™ A

No other laser printer makes the power of laser printing as affordable or as easy to use as the Qume LaserTEN. You get professional looking printing, crisp graphics, multiple type fonts with unprecedented ease of system interfacing, operation and maintenance.

For the multi-user office or the single-user PC.

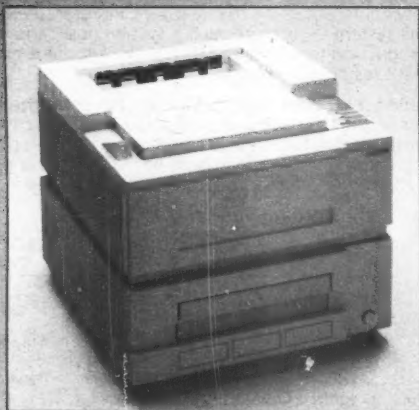
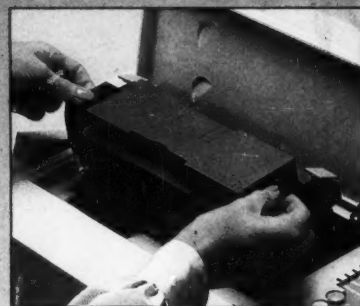
With its ability to print out 10 pages a minute with a high-resolution 300 x 300 dots-per-inch density for black,

solid characters and detailed graphics, the Qume LaserTEN can easily handle the day-in, day-out production and quality demands of your clustered workstations and local area networks. Up to 5,000 pages a month! Yet, for all of that, it's priced low enough to justify its dedication to a single PC workstation with integrated text and graphics applications.

A new ease of interfacing.

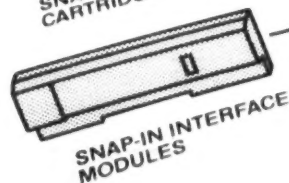
If you're already using one of today's popular computers or printers, you'll discover that moving up to a Qume LaserTEN or LaserTENPLUS with enhanced graphics is one of the

easiest moves you've ever made. Not only do they emulate all of the most popular laser, daisywheel and dot-matrix printers (with the software you



EASY DOES IT FROM START TO FINISH.

- ✓ 10 pages per minute
- ✓ Letter quality text
- ✓ Up to 300 x 300 dots per inch graphics
- ✓ Up to 20 fonts per application
- ✓ Emulates most popular printers
- ✓ Drum and developer pages
- ✓ Toner lasts
- ✓ Input tray
- ✓ Compact
- ✓ Face d



great deal. Easier.

already have), changing computers is as easy—and as fast—as snapping in a new interface module.

With the LaserTEN you also enter a new world of printing sophistication. It not only supports proportional spacing, super- and sub-scripts, bold face and underlining, it adds some twists of its own: reversing type, double-high and double-wide expansion, type extending, condensing and slanting. And, in addition to the LaserTEN's resident fonts, Qume is making available more than 100 type styles in snap-in cartridges. Use up to 20



different typefaces per page, depending on the application.

Simply sophisticated to make it simply reliable.

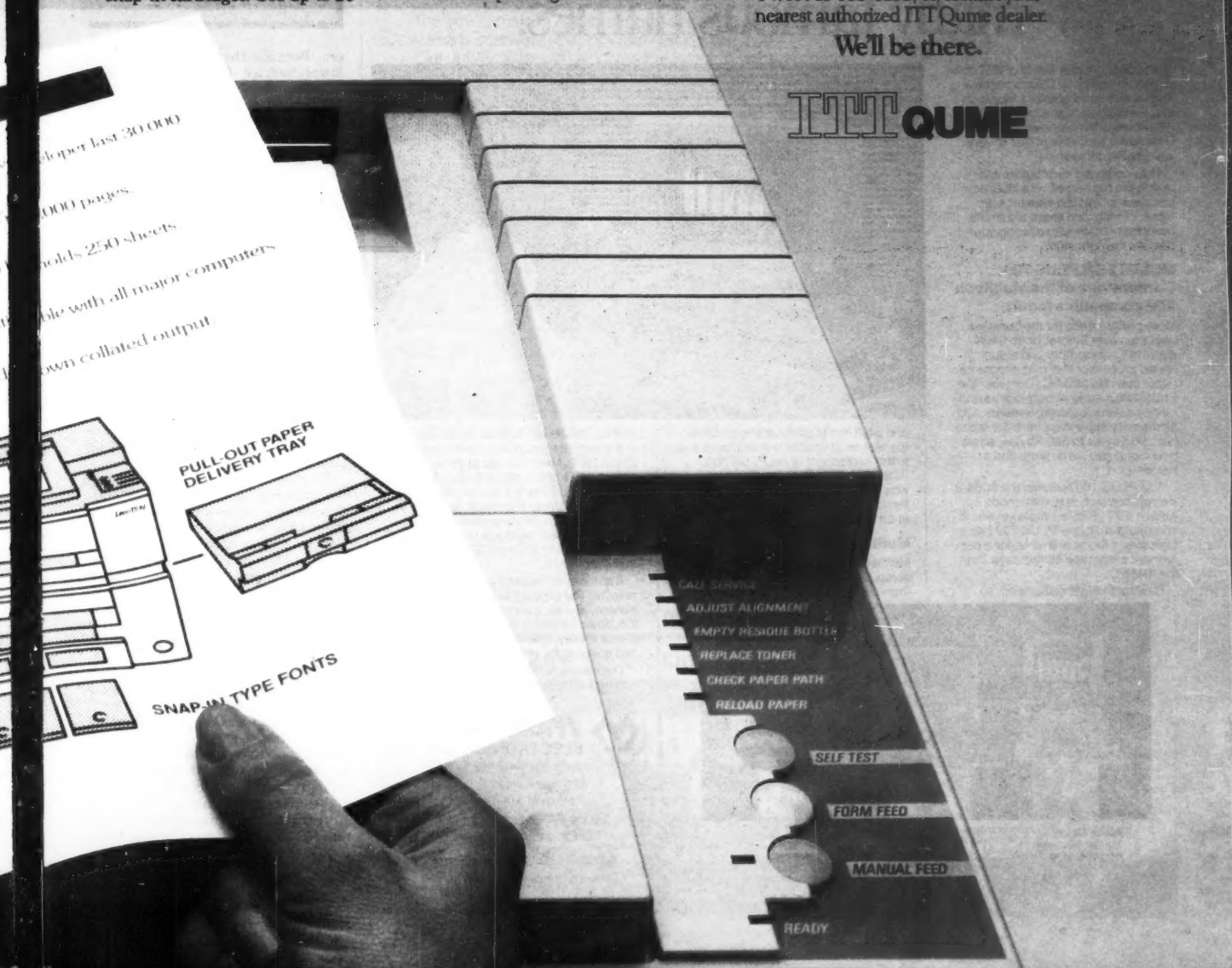
The LaserTEN gives you the best of everything in laser printing: the most durable printing drum made, a dual

processor controller with advanced interfacing and printing features for faster processing, modularity of all consumable components, extra-strength parts throughout. As a result, the LaserTEN will run for months with virtually no service and a minimum of supplies. And, for the long-run, you know that ITT Qume, the special ITT financing available through your dealer, and the ITT SERVCOM Network will give you the service and support you need.

To find out how you can make a great deal, easier, call ITT Qume at (800) 223-2479; TELEX 40970122; TWX 910-338-0232; or contact your nearest authorized ITT Qume dealer.

We'll be there.

ITT QUME



COMPUTER INDUSTRY

Third-party service group seeks vendors' cooperation

Sets goal of access to parts, documentation

By James A. Martin

ATLANTA — If third-party hardware maintenance companies are to take full advantage of potentially huge markets, they must join forces to challenge effectively the large computer vendors that do not make spare parts and equipment documentation available to them.

That is the credo of the National Computer Services Network, which took a step closer toward achieving that goal with its first membership conference, held recently. About 125

representatives of both fledgling and established third-party service firms attended sessions and exchanged ideas on how to beat their formidable competition — the large vendors that do not cooperate with small, third-party service companies.

Many hardware vendors have not taken kindly to independent service firms, withholding discounts on spare parts or refusing to do any business with them whatsoever [CW, Oct. 21]. This presents a major challenge to the independent service industry and has placed what it considers to be unfair restrictions on its growth.

The group was organized in Washington, D.C., last year to bring mem-

bers together to form a unified voice in speaking out against this problem.

'We want to be recognized'

"The objective here is not to represent so much of a challenge to the large vendors but to show that this business is a reality and that we want to be recognized," said National Computer Services Network Chairman Richard Intile, vice-president of Computer Maintenance Corp. of East Rutherford, N.J.

Exactly how to overcome this dilemma is not clear at this point. One method is to lobby Congress and the Federal Trade Commission (FTC), informing them of the problems in the industry and the need for solutions.

But an industry class action suit is not a likely solution to the problem, according to W. James MacNaughton, a Morristown, N.J., attorney who spoke on legal options at the conference. "For a class action suit, the players have to be in the same boat, but each player here has a separate market niche, whether it is geographically or in products," MacNaughton said.

MacNaughton said joint lawsuits from two or more independent service companies as well as continued lobbying efforts aimed at Congress and the FTC might prove more effective. The key to success, however, will be how well the organization and the industry it represents can band together. "There needs to be a demonstration that this is an industry-wide problem," MacNaughton said. "One company going to the Justice Department doesn't have that much clout. Trade groups are much more effective in addressing common legal problems."

Many third-party service firms are taking the problem to their custom-

**Computer Industry section
begins on page 142.**

Multitech— the computer family that carries many famous names.

Introducing a new family of IBM compatible computers that's not new. You've seen and admired Multitech systems for years, the only difference is the name on the front. Until now it was always that of very well known companies.

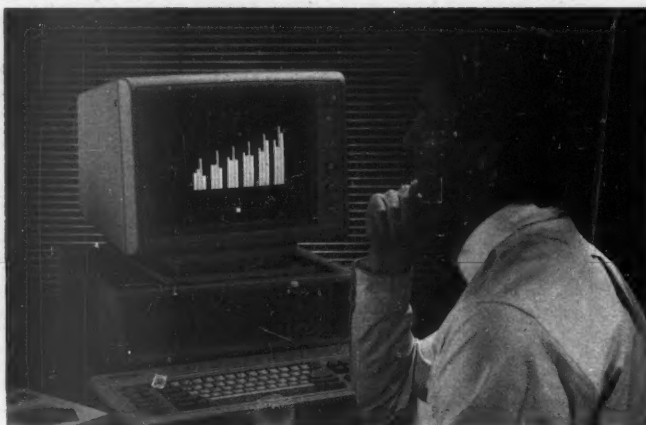
Now computer distributors can match the big names with Multitech computers. Join the Multitech distributor family and share the excitement that comes with offering your dealers the right stuff.

MULTITECH PLUS 700 ... Cornerstone of the Multitech IBM compatible family.

More performance for the business user than ever before. Up to 640K bytes of user memory and a dual speed processor that runs programs faster than the IBM PC. Consider the PLUS 700's array of built-in time and money saving features; features such as memory expansion from the standard 256 Kbytes to 640 Kbytes, a real time clock, two serial ports and a parallel port.

The PLUS 700 features the 8088-2 microprocessor. In normal mode it runs at 4.77 MHz, a simple keyboard command shifts the PLUS 700 into a high speed mode of 8 MHz, for a performance increase 60% greater than the IBM PC.

Dual half-height diskette drives,



and a full line of IBM expansion cards to meet most special requirements add to the excitement of the PLUS 700. It's the ideal computer for users who demand personal computer performance together with PC reliability at an economical price.

Multitech Corporation

Multitech ... it's not just another new computer company. It is a leading manufacturer in the computer age,

and its Taiwan manufacturing facility is the largest for personal computers. Since 1976, Multitech has been a pioneer in microcomputer technology. Today its products are sold in more than 40 countries. Earning a worldwide reputation for consistent high-quality, Multitech products have captured the loyalty of large OEMs, VARs and distributors.

Call today to become a Multitech reseller. The product selection, quality, service, and support from one of the industries foremost leaders ensures dealer loyalty, end user acceptance and success for your business.

Distributor, VAR and OEM inquiries welcome.

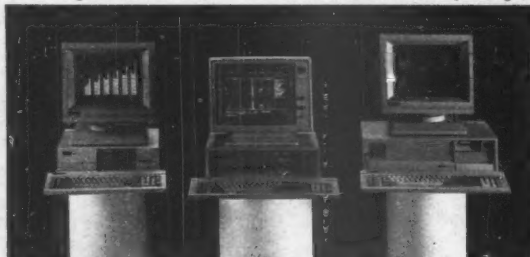


Committed to Excellence, Quality & Service

1012 Stewart Drive
Sunnyvale, CA 94086

Call toll-FREE 800 538-1542
In CA call 408 773-8400

A Division of MSC International
Served Nationwide by TRW



POPULAR 900 ...
The IBM PC compatible
with outstanding quality
and economy.

PLUS 700 ...
The 8 MHz IBM
compatible computer for
high speed applications.

ADVANCE 900 ...
The IBM PC-AT
compatible for high
performance and
advanced applications.

ers. Because they are able to offer lower service fees than hardware vendors, third-party companies are hoping to persuade customers to switch to or stay with equipment supplied by the few vendors such as IBM that do cooperate with them [CW, Jan. 27].

"Because of this, many large vendors are beginning to feel the competitive pressures. As a result, they are going to have to open up a little bit in this area," said Al Andrus, president of Grumman Systems Support Corp. of Woodbury, N.Y., and a National Computer Services Network director.

Despite the barriers created by the leading hardware vendors, the third-party service industry continues to show solid growth. It grew into a \$1 billion industry in 1985 and should expand another 15% to 20% this year, according to D.R. MacNaughton, president of Business Development International of Franklin Lakes, N.J.

MacNaughton, a consultant and the father of lawyer W. James MacNaughton, said he sees no solution to the problem of large vendor cooperation in the near future. "It won't come in 1986 or 1987. The large vendors won't give up without a lot of court tests," he said.

MacNaughton said lawsuits from independent service companies will be needed in order to focus attention on the issue because the Reagan administration generally is not interested in placing any new governmental restrictions on business.

The National Computer Services Network has as good a chance as any trade group in trying to rally support for its causes among legislators and industry members, according to several conference attendees.

"I think the organization has gotten off to a good start," said Fred Hall, a group member and an engineer with CACI, Inc., of Arlington, Va. "But it is much too early to say if they have been successful or not. It's all really just getting started."

ON JULY 9, WE FOCUS ON SOFTWARE.

The market for software is simply going wild. With new applications. New technologies. New ideas. And MIS/DP professionals are the ones who have to deal with it all.

The key is making different software work together. Not just applications software, but operating software, too.

Our July 9 issue will address the latest in software from DBMS to decision support systems to fourth generation languages and the role each plays in integrated systems.

Then we'll zero in on productivity.

Our July special section also tackles one of the biggest software issues. Productivity.

We'll start with a look at the popular and innovative products that are the driving force behind most hardware today. We'll update readers on the continuing evolution of 4GLs, DBMS systems and more. We'll check out new and developing tools for system productivity. And, finally, we'll ask MIS professionals how they're planning to implement all these new products and technologies.

Reach the people you really want.

We'll be reaching precisely the people you want to reach. 129,000 paid Computerworld subscribers. Plus thousands of pass-along readers. Plus attendees at PC Expo and Software Expo. If you're involved in software marketing, you couldn't ask for a more qualified audience of decision makers.

We'll even be providing you with a free Starch study for qualifying advertisements. Which can help you determine if your advertising is as effective as your media buy.

Reach your audience effectively — and efficiently — in July's Software Focus.

But hurry, closing is May 30. For more information, contact Ed Marecki, Vice/President Sales, Computerworld Focus, 375 Cochituate Rd., Framingham, MA 01701-9172, (617) 879-0700. Or call your local Computerworld sales representative.

Issue: July 9 - Closing: May 30

COMPUTERWORLD FOCUS

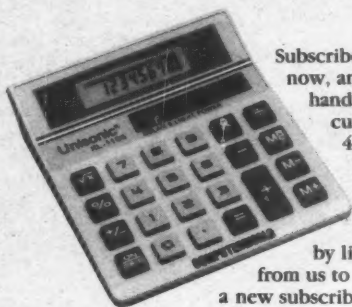
We put the hottest issues of the day in focus.

A PUBLICATION OF
CW COMMUNICATIONS

SALES OFFICES: Boston: (617) 879-0700 New York: (212) 967-1350 Atlanta: (404) 394-0758 Chicago: (312) 827-4433 Dallas: (214) 991-8366
San Francisco: (415) 421-7330 Los Angeles: (714) 261-1230

Why the time has never been better to get your own subscription to Computerworld.

FREE SOLAR CALCULATOR WITH YOUR PAID SUBSCRIPTION



Subscribe to *Computerworld* now, and we'll send you this handsome desktop solar calculator. FREE. It's a big 4 1/4" x 4 3/4" calculator that features large, easy-to-press keys. And it never needs batteries because it's powered by light. As we said, it's a gift from us to thank you for becoming a new subscriber to *Computerworld*.

YOU'LL ALSO RECEIVE SPECIAL FOCUS ISSUES

As a *Computerworld* subscriber, you'll also receive our highly-acclaimed COMPUTERWORLD FOCUS issues — at no extra charge. Published once a month (except July and December), these bonus issues focus on a single topic. Here is a sampling: Software, UNIX™, Communications, Office Automation, Manufacturing, Microcomputing, and much more. COMPUTERWORLD FOCUS helps you plan, purchase, and save money. And these bonus issues are sent only to *Computerworld* subscribers — it's like getting a subscription to a second magazine FREE!

As you can see, there are plenty of reasons to subscribe to *Computerworld*. So don't rely on someone else to lend you theirs. Be well-informed — with 51 issues of *Computerworld* plus the COMPUTERWORLD FOCUS issues — without having to wait.

Now you know why the time has never been better to subscribe to *Computerworld*.

UNIX is a trademark of AT&T Bell Laboratories.

51 ISSUES OF COMPUTERWORLD

In addition to the free solar calculator, of course, you'll receive 51 issues of *Computerworld*. So you won't have to wait for a co-worker's copy to keep up-to-date on what's taking place in the computer field.

☐ **Yes!** Please send me *Computerworld* for one year (51 weekly issues) at \$44. Plus I'll receive a desktop solar calculator FREE with my paid subscription and 10 COMPUTERWORLD FOCUS issues at no extra charge. (Please allow 6-8 weeks for delivery of your free calculator.)

Subscription Form

First Name _____ Middle Initial _____ Last Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

☐ Bill me.

☐ Payment enclosed. Send my FREE calculator immediately.

☐ Charge to my credit card and send my FREE calculator immediately.

☐ AmEx ☐ VISA ☐ MC Card Expires: _____

Signature _____

If you are using a credit card, you can enter your order by calling TOLL-FREE: 1-800-544-3712 (in Pennsylvania, call collect: 215-768-0388)

Address shown is: ☐ Home ☐ Business

Computerworld Guarantee:

I understand that I may cancel my subscription at any time, and request a full refund of the unused portion of my subscription.

Please indicate your business, function, and computer involvement below. Circle number in Categories 1 and 2 and all that apply in Category 3.

1. BUSINESS/INDUSTRY (Circle one)

- 10. Manufacturer (other than computer)
- 20. Finance/Insurance/Real Estate
- 30. Medicine/Law/Education
- 40. Wholesale/Retail/Trade
- 50. Business Service (except DP)
- 60. Government — State/Federal/Local
- 65. Public Utility/Communications Systems/Transportation
- 70. Mining/Construction/Petroleum/Refining/Agriculture
- 80. Manufacturer of Computers, Computer-Related Systems or Peripherals
- 85. Computer Service Bureau/Software/Planning/Consulting
- 90. Computer/Peripheral Dealer/Distributor/Retailer
- 75. User: Other _____
- 95. Vendor: Other _____

(Please specify)

2. OCCUPATION/FUNCTION (Circle one)

- 11. President/Owner/Partner/General Manager
- 12. VP/Assistant VP
- 13. Treasurer/Controller/Financial Officer
- 21. Director/Manager/Supervisor DP/MIS Services
- 22. Director/Manager of Operations/Planning/Admin. Serv.
- 23. Systems Manager/Systems Analyst
- 31. Manager/Supervisor Programming
- 32. Programmer/Methods Analyst
- 35. QA/QP Director/Manager/Supervisor
- 38. Data Comm. Network/Systems Mgmt.
- 41. Engineering/Scientific/R&D/Technical Mgmt.
- 51. Manufacturing Sales Reps/Sales/Marketing Mgmt.
- 60. Consulting Management
- 70. Medical/Legal/Accounting/Management
- 80. Educator/Journalist/Librarian/Student
- 90. Other _____

(Please specify)

3. COMPUTER INVOLVEMENT (Circle all that apply)

Types of equipment with which you are personally involved either as a user, vendor or consultant.

- A. Mainframes/Superminis
- B. Minicomputers/Small Business Computers
- C. Microcomputers/Desktops
- D. Communications Systems
- E. Office Automation Systems

Fill in and return to:

COMPUTERWORLD

P.O. Box 1016, Southeastern, PA 19398-1016



COMPUTERWORLD
 THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

8A1818146

COMPUTER INDUSTRY

Analysts on a Blue streak

From page 142

from year-earlier levels, apparently proving that Big Blue's fourth-quarter windfall mainly reflected a lot of buy-before-year-end MIS decisions as well as IBM's own all-out effort (which fell short) to post full-year profit growth.

Meanwhile, Chairman-Elect and CEO John Akers continued to emphasize words like "caution" and "uncertainty" in commenting on the results. With most companies, that's a corporate euphemism for "We're in trouble," but in IBM's case, the analysts are actually talking more optimistically than the CEO.

Despite some notable contrarians who honestly believe that the trend to networked, microprocessor-based systems at the expense of mainframes will be IBM's downfall, most observers say IBM will do whatever it has to do to succeed — and it will.

One example, February's price cuts, didn't make recent full-price purchasers of the discounted boxes very happy, but they should serve to perk up demand. "If they don't," says Robert Fertig of Enterprise Information Systems, Inc., "IBM will cut again, which will really put the squeeze on the competition."

While few say that Big Blue can post 15% annual growth to reach \$100 billion in revenue by the end of the decade, there is every reason to

be bullish on IBM — in the context of a slower computer market overall. IBM's sluggish first quarter is the most telling sign that the industry itself is not out of the woods.

But the analyst community feels that IBM's vaunted power, resources and product cycles are fully poised for a rebound later this year, even if the industry stays in the doldrums. IBM has outperformed the industry before; 1986 will be no exception.

In response to Sperry Corp.'s recent institution of operating system license fees for third-party mainframe buyers, brokers of Sperry equipment are moving to protect themselves. While still hoping that Sperry will reconsider the policy, they are adopting what amounts to an indemnification clause in their contracts. "We basically quote two prices, one of which includes the software charge," says Robert Newstead, vice-president of Oak Creek Funding Corp. in Phoenix. "That's what we will have to do until this issue is resolved."

It may be just another superficial, wishful-thinking-type of move by a trade group, but the American Electronics Association has formed an import promotion committee jointly with the Electronics Industries Association of Japan (EIAJ). Time will tell if it meets the goal of getting more Japanese firms to buy U.S. electronics gear, but it sure beats the Semiconductor Industry Association bashing heads with the EIAJ over chip-dumping statistics.

Rethinking software tactics

From page 142

his firm continues to develop micro applications software packages. Computer Associates will unveil new micro software products aimed at the mainframe and retail markets within the next couple of months, which will raise the 10-year-old firm's visibility, Wang says.

But Wang declines to provide specifics, citing corporate policy that prohibits the discussion of new products until they are ready to be shipped. "We will not play the vaporware game," he says.

Wang points to a variety of micro software packages Computer Associates has unveiled over the last year, which he says shows the firm's continued commitment to the micro marketplace. Products such as Easy Plus, a windowing and networking package that supports 3Com Corp., Novell, Inc. and IBM networking schemes as well as new billing, payroll and retail invoicing modules for the firm's accounting series are indications of the firm's dedication to the market, he notes.

Analysts expect the firm to report

profits of about \$18 million, down from the record-breaking \$21.4 million chalked up last year. Although Computer Associates does not break out operating results of its divisions, analysts say the Micro Software Division is only marginally profitable.

It is the division's continuing poor performance that is said to be causing Computer Associates' Micro Software Division to de-emphasize new applications software development, insiders say. "There's a move toward more product enhancement of late," one Micro Software Division insider laments. "It's really hard, though, to say what it means."

Although Computer Associates continues to unveil micro implementations of a number of its mainframe software products and enhanced versions of its existing micro packages, it has not entered any new market segments of late — in sharp contrast to micro software leaders like Lotus Development Corp., Ashton-Tate and Software Publishing Corp. The firm continues to leverage its strengths in the IBM mainframe software market by asserting dominance in the micro-to-mainframe link businesses.

As evidenced by its recent site licensing deal with General Electric Co. [CW, Jan. 20], Computer Associates appears to be embracing new

See RETHINKING page 122

REACH MEXICO'S INDUSTRY LEADERS. ADVERTISE IN COMPUTERWORLD/MEXICO

Advertise in *Computerworld/Mexico* and sell your products directly to Mexico's burgeoning computer community. According to International Data Corporation (IDC), the world's leading information industry research firm, there are over 21,000 computers in Mexico.

Over 10,000 MIS/DP professionals in government, banking and industry read *Computerworld/Mexico*. Modeled after *Computerworld*, its sister publication in the U.S., *Computerworld/Mexico* is considered an excellent way for advertisers to reach a broad range of influential industry leaders. Twice each month, *Computer-*

world/Mexico reports developments in hardware, software and terminals as well as industry trends.

CW International Marketing Services makes advertising your products in Mexico and around the world, easy. We have over 55 publications in more than 25 countries around the world. For more information on our wide range of services, complete the coupon below and mail today.



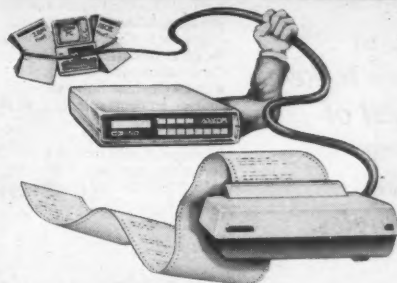
Please send me more information on:
☐ *Computerworld/Mexico*
☐ Your other foreign publications

Name _____
 Title _____
 Company _____
 Address _____
 City _____ State _____ Zip _____



CW COMMUNICATIONS, INC.
 Frank Cutitta
 Managing Director
 International Marketing Services
 CW Communications/Inc.
 375 Cochituate Road
 Framingham, MA 01701-9171

ADApaint... THE ASCII PRINTER ADAPTER THAT TIES IT ALL TOGETHER.



Adacom Corporation's ADAPrint (CP-150) is not just another printer adapter. It does more than just IBM 3287 emulation.

THREE WAY SHARING.

ADAPrint gives you full IBM 3287 emulation (LU1/LU3) plus the ability to use the same ASCII printer for both PC and mainframe applications. Now you can tie the same fast ASCII printer to an IBM host, an ASCII host and an IBM PC. All at the same time.

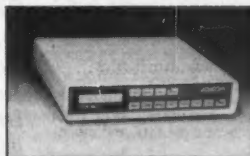
ADAPrint also increases printer functionality with new printing applications such as bar code, graphics, extended character sets, international language selection and hex transparent transmission.

COST SAVINGS.

ADAPrint saves you the expense of a costly IBM 3287. And you save coax installation costs, too. ADAPrint supports ASCII serial or parallel printers including Epson, Okidata and even the IBM Pro Printer.

CALL 1-800-3270ADA.

For more information, call or write Adacom Corp., 8871 Bond St., Overland Park, KS 66214. 1-800-3270ADA. In Kansas call (913) 888-4999.



ADAPrint increases printer performance at lower cost.

ADACOM
 YOUR 3270
 COMMUNICATIONS COMPANY

IBM is a registered trademark of International Business Machines Corporation.

COMPUTER INDUSTRY

Rethinking software tactics

From page 121

methods to increase market penetration of its micro packages. Site licensing, which could boost micro software revenue in the short term, may be insufficient to sustain longevity.

"Computer Associates has been struggling in a tough, competitive environment," notes analyst Brian Mutert of Robertson, Colman & Stephens in San Francisco. "They have done well at site licensing by offering large corporations favorable terms with volume purchases, but that's not a strategy that will help them be a long-term winner."

Although Computer Associates

was one of the first mainframe software vendors to forge links with the microcomputer world, its transition into the applications market segment has been fraught with difficulties.

The firm has built its micro software critical mass through acquisition of companies. In 1983, Computer Associates acquired Information Unlimited Software, Inc., which developed the Easy Business accounting software line. The following year it purchased Sorcim Corp., the high-flying developer of Supercalc. The two organizations make up the bulk of the Micro Software Division.

Micro software revenue has remained in the \$20 million range over the last two years, analysts estimate, a figure that Wang says, without elaborating, is on the low side.

"Micro software revenue for fiscal 1985 was down from 1984, even

though they acquired Sorcim halfway through the year," Mutert says. "If you look at things on a pro forma basis, they should have generated \$25 million."

Wang acknowledges that results have not met management's expectations. "You have to remember, though, that we've grown at an aggregate rate over the last few years of about 50%," he says. "We have large expectations."

Gartner Group's Smith believes that despite tough sledding, Computer Associates will not completely withdraw from the micro applications market.

Known as a bottom-line-oriented firm, Computer Associates is expected to concentrate on niche applications with high profit margins while trying to maximize its advantage in the mainframe-to-micro link area.

INDUSTRY NOTES

Ashton-Tate to sell Javelin

Continuing a trend of major microcomputer software vendors marketing other vendors' products overseas, Ashton-Tate announced it will market and distribute Javelin Software Corp.'s Javelin product outside the U.S. and Canada. Ashton-Tate will distribute the English language version of Javelin through subsidiaries in the UK, West Germany, the Netherlands, Spain, Italy and Australia and distributors in six other countries.

Wang Laboratories, Inc. purchased its South Korean distributor and integrated it into a new wholly owned subsidiary, Wang Computer Korea Ltd. The Seoul, South Korea-based unit will include a plant for manufacturing Wang personal computers and printer interfaces, scheduled to open later this year and to employ 100 workers. The plant will be Wang's seventh outside the U.S. and will join a Taiwan facility as the second in the Far East.

Control Data Corp.'s independent auditors said the company's current financing plans may not be enough to pay its \$383 million short-term debt obligations by the end of this year. The opinion by Peat, Marwick, Mitchell & Co. could put more pressure on CDC to sell more parts of the firm or otherwise obtain added financing. CDC is reportedly close to the sale of its Ticketron subsidiary to New York investment firm Allen & Co.

Baron Data Systems of San Leandro, Calif., announced the acquisition of Sterling Software, Inc.'s Informatics Legal Systems division. Terms were not disclosed. The Phoenix-based law-related software and turnkey systems unit had sales of about \$30 million last year.

Decision Support Software, Inc. (DSS), a small micro software developer in McLean, Va., has filed a \$10.4 million suit against Dow Jones & Co. and one of its marketing subsidiaries, Richard D. Irwin, Inc. DSS claims that the subsidiary fraudulently broke its agreement to market its financial management product, the Accountant Finance Data Base System.

Fairchild Semiconductor Corp. has purchased 5% of San Diego-based Brooktree Corp. in a deal that will allow Fairchild to manufacture Brooktree's line of digital-to-analog and analog-to-digital converters. The \$3.6 million agreement also makes Cupertino, Calif.-based Fairchild a second source for about 20 existing and future Brooktree products. Founded in 1981, privately held Brooktree has approximately 90 employees. The Brooktree purchase represents Fairchild's move away from the large-scale commodity chip market to more specialized products.

EDUCATION

STRATEGY:

To develop an ongoing education program to keep informed of changing software technologies.

Knowledge provides power. Education is the route to that knowledge.

Acknowledged as the "authorities" in DP advanced training for over 15 years, On-Line Software International, Inc. offers courses that are the most comprehensive and demanding of their kind. They have been attended by over 12,000 DP professionals, nationwide.

It is imperative that you develop an ongoing educational program for your DP staff to meet the demands of the evolving data processing industry.

CICS

Tailored to varying experience levels, CICS courses address application programming and design, logic and debugging, internal, MRO/ISC, performance and tuning, as well as recovery/restart. Participants receive a complimentary copy of the CICS/VS Reference Handbook.

IMS

Two IMS/VS courses are offered. One provides advanced training in coding batch and on-line application programs which access IMS/VS data bases; while the other discusses IMS Data Communications features. As with all On-Line Software courses, students receive a course manual which also functions as an on the job reference. Participants also receive a complimentary copy of the IMS/VS Reference Handbook.

VTAM

This course examines data flow in a VTAM environment and the SNA functions implemented by network elements. It is geared to data processors who have a working knowledge of on-line systems (such as CICS or IMS) and familiarity with teleprocessing concepts and BAL.

VSAM

VSAM structure and requirements for its effective implementation are presented in this course, including its use on-line (with CICS/VS), batch (with COBOL, Assembler or PL/I) and through Access Method Services.

Intro to Microcomputers for Executives

This course familiarizes managers with PCs, communications, spreadsheet analysis, data management, color graphics and plotters, and much more.

Where

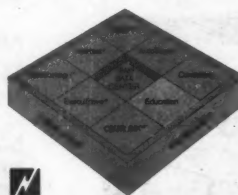
On-Line Software advanced training courses are conveniently offered in Atlanta, Boston, Chicago, Dallas, Denver, Detroit, Fort Lee/NJ, Los Angeles, New York City, San Antonio, San Francisco, and Washington, DC. Advanced training can also be provided in-house, if desired.

When

Courses run between 2 and 5 days, depending on the subject and are offered on a continuous basis at the sites mentioned above. A complete schedule is available.

Action

Be sure your DP staff has the education it requires to function as efficiently as possible. Contact the IBM® Software Authorities. Call or write to set up your ongoing education program now. **Call Toll-Free 1-800-526-0272**



On-Line Software International, Inc.

IBM® Software Authorities

IBM is a registered trademark of International Business Machines

MIS DP SOFTWARE STRATEGIES

COMPUTER INDUSTRY

Boole & Babbage set to appeal patent infringement suit

L.A. court ruled patent invalid

SUNNYVALE, Calif. — Systems software vendor Boole & Babbage, Inc. said it plans to appeal a patent infringement case against Candle Corp. of Newport Beach, Calif., after a Los Angeles

Federal Court jury ruled a Boole & Babbage patent to be invalid.

In the somewhat unusual decision, the jury also said several of Candle's system software products infringed upon Boole & Babbage's patented methodology for measuring software performance. However, since the patent was first deemed in-

valid, the infringement decision is essentially moot.

The jury said Boole & Babbage's 14-year patent was invalid because the company waited too long to apply for patent protection on the methodology used in its software products. According to current patent law, companies have one year from the time a product is put on the

market to apply for a patent.

"The net effect leaves both Candle and Boole & Babbage where they were before the decision was handed down," said Boole & Babbage attorney Mitch Zimmerman.

"It is a nondecision in a lot of ways," Zimmerman added.

The U.S. Court of Appeals must first determine Boole & Babbage's methodology pat-

ent to be valid before any infringement actions can be taken against Candle, he explained.

In that case, Boole & Babbage will argue that the patents are valid because the software was only being tested and was not in the public market during the year in question, attorneys said.

— Maura McEnaney



Ask Computer Systems, Inc. reported revenue for the third quarter ended March 31 of \$17.6 million, compared with \$19.2 million in the previous year. Profits were \$1.4 million, or 11 cents per share, compared with \$1.8 million, or 14 cents per share, in the like period a year ago.

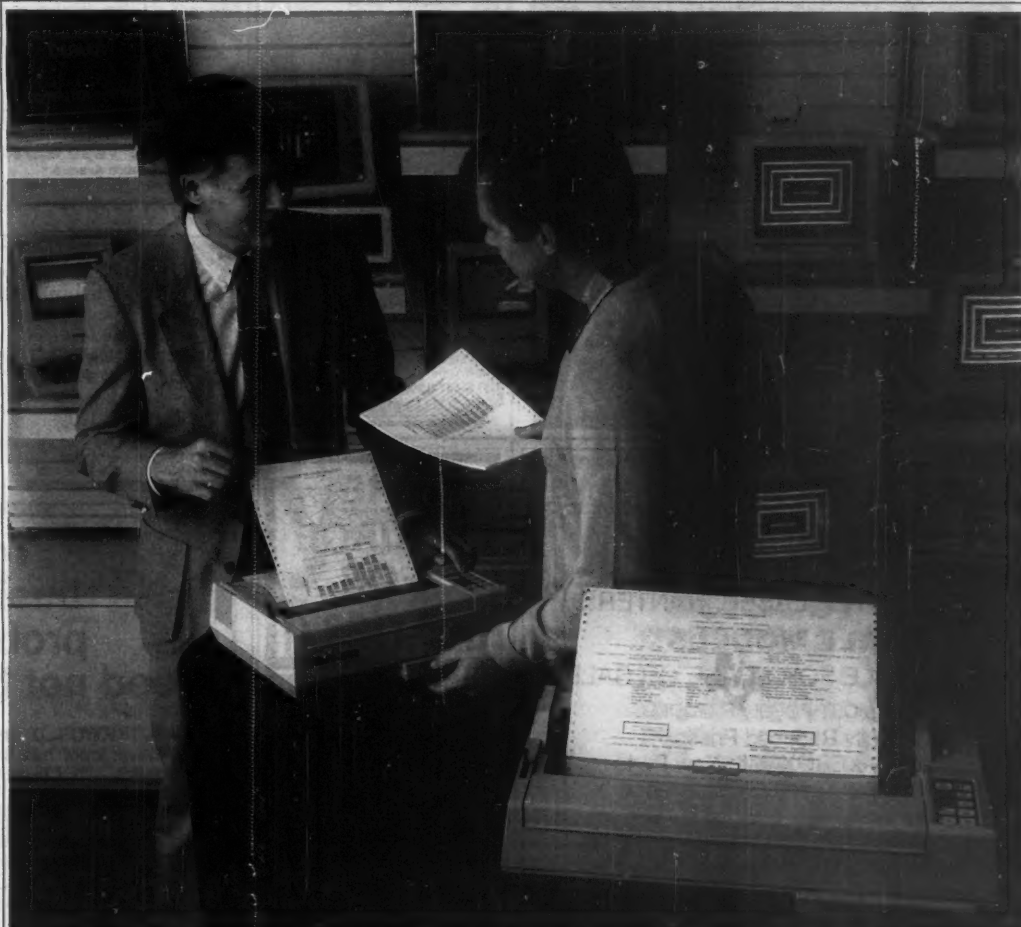
Miniscribe Corp. announced revenue for the first quarter ended March 30 of \$40.3 million, compared with \$23.9 million in the like period a year ago. Net income for the quarter was \$4.7 million, or 14 cents per share, compared with a net loss of \$12.5 million, or 67 cents per share, in the previous year.

Seeq Technology, Inc. reported revenue for the quarter ended March 31 of \$8.5 million, compared with \$9.1 million in the comparable period a year ago. The company also reported a net loss of \$4.3 million, or 37 cents per share, compared with a loss of \$4 million, or 30 cents per share, for the same period in the previous year.

Cipher Data Products, Inc. reported revenue for the third quarter ended March 31 of \$40.2 million, compared with \$44.4 million one year ago. Profits were \$1.7 million, or 12 cents per share, compared with \$4.3 million, or 30 cents per share, in the previous year.

Digital Communications Associates, Inc. announced revenue for the third quarter ended March 31 of \$36.5 million, compared with \$23.9 million for the same period a year ago. Profits were \$5.9 million, or 48 cents per share, compared with \$2.7 million, or 26 cents per share, in the like quarter of last year.

Oracle Corp. reported revenue for the third quarter ended Feb. 28 of \$16 million, compared with \$5.5 million for the same quarter a year ago. Profits for the quarter were \$2.1 million, or 15 cents per share, compared with \$141,000, or 1 cent per share, in the previous year.



If you buy a TI 855 printer now, you won't have to upgrade to one later.

Don't tack just any printer on your new PC for now, thinking that you'll get what you really need later. Start with the best, a TI 855 or TI 865 printer. That way you can put the money you'd have spent on a needless upgrade on some other smart investment.

You see, our OMNI 800™ Model 855 is actually three printers in one. For word processing, it delivers letter-quality printing that rivals the best daisy wheel printers around. For data processing, it prints at 150 characters per second. And for your graphics, it reproduces screen or

28277
©1985 TI

monitor images in the finest detail.

Of course, these advantages are all true of our TI 865 wide-carriage printer, too.

What's more, since our printers are among the easiest to use, you can utilize all the capabilities built into your PC and software right from the start. Instead of sometime later. You even have a choice of over 30 different plug-in type fonts, any three of which can be printed on the same page without ever stopping the printer! Just touch the control panel and it happens. Simple. So every document looks just the way you want it to. Professional.

As for reliability, TI printers are legendary. Just ask any major airline.

So don't downgrade your PC's performance with a printer you'll outgrow in a month. Get yourself a TI 855 or TI 865 printer now. It's easy. Just call 1-800-527-3500, ext. 801, for the TI Dealer near you.

TEXAS INSTRUMENTS
Creating useful products and services for you.

BUY - SELL - SWAP

BUY • SELL • LEASE • TRADE

800-423-8436

S/34 - 36 - 38

• All Upgrades Available Now
• All Models and Peripherals

S/10 S/20 DATAMASTERS

4331/4341
4361/4381All
Peripherals

LSC
LONE STAR
COMPUTER
CORPORATION

Series/1
Peripherals IBM CDC
Compatible to New
Specifications

SUITE 230
1901 CALIFORNIA
WESLITE, TEXAS 75150
IN TX (214) 881-7871

IBM
CDC

If Data General makes it...NPA

- SERVICES
- SELLS
- TRADES
- LEASES &
- PURCHASES IT!!!

Data General

Specializing in field service, depot repairs & upgrades.

NPA will not compromise on quality, customer satisfaction or total solution but our pricing is always negotiable.

NPA Systems Inc.

761 COATES AVE. HOLBROOK, NY 11741
2322 FIFTH ST. BERKELEY, CA 94710
NPA Systems, Inc. NPA Systems, Inc. of
NEW YORK CALIFORNIA
516-467-2500 415-848-9835
TELEX 510-222-0800

Inflation Fighters

Quality & Savings

Slightly used, Money Back Guarantee. Full Reels. All External Labels Removed. Guaranteed for use at 1600 BPI through 6250 BPI.

2400' Reel \$4.95 ea.
1200' Reel \$4.50 ea.
600' Reel \$3.75 ea.

All Tapes with Hanging Seals

We pay freight on orders over 200 tapes.

All orders shipped within 48 hours.

Call or Write

Computer Tape Mart
44A Seabro Avenue
N. Amityville, New York 11701
[516] 842-8512

DEC EQUIPMENT

- ★ Immediate Delivery
- ★ Fully Guaranteed
- ★ Lowest Prices

701-282-8380

ESS COMPUTER

123 E. MAIN

WEST FARGO, ND

58078



IBM
HARDWARE
BUY • SELL • LEASE

SERIES-1

S/34 • S/36 • S/38
S/23 • 4300 • P03

AMCOM
CORPORATION

5200 W 73RD ST.
MINNEAPOLIS, MN 55435
612-835-4737 600-328-7723

Two Year Lease
3081-G 24 x 24
Available May 15th, 1986

Sale Or Lease

4248-1

Available Immediately

Call Ext. 401

(800) 821-0229

(818) 986-2411

in California

El Camino Resources

INTEGRATED LEASE PLANS, INC.

AN INTEGRATED RESOURCES COMPANY
733 THIRD AVENUE • NEW YORK, NY 10017 • 212-551-5000

XEROX 9700'S

HIGH SPEED
COMPUTER LASER PRINTERS

ALL MODELS

AVAILABLE FOR LEASE OR SALE

FOR MOST POPULAR MODELS:

- Substantially Reduced Prices
- Rebuilt By XEROX With New Parts
- Qualified For XEROX Maintenance
- 30 Day Trial
- Application And Operation Assistance Provided

CALL TED WUNDER or JACK KIELAR
at 212-551-5603

THE
SOURCE
FOR
Series/1
ECONOCOM

• BUY • SELL
• LEASE
NEW OR USED

ECONOCOM-USA, INC.
RAB CROSSOVER LANE
P.O. BOX 24029
MEMPHIS, TENNESSEE 38124
(901) 767-9130 or
(800) 238-3098

CDLA **AEL**

THE COMPUTER
LEASING
HOT LINE:
800-243-5307
(In CT. call 203-661-4200)

You don't have to wait. Call us now for the best rates going on IBM systems... from 4381's to 3090's and everything in between. Ask for Thomas McShane.

Randolph



Randolph Computer Corporation
Subsidiary of Bank of Boston • 537 Steamboat Road, Greenwich, CT 06830



IF YOU'RE BUYING, WE'RE SELLING.

36
38
4300

IF YOU'RE SELLING, WE'RE BUYING.

IBM SYSTEMS Buy • Sell • Lease PERIPHERALS
(800) 331-8283
TOLL FREE
(213) 306-9343
CALIFORNIA

Ocean Computers, Inc.
8655 W. Manchester Ave., Ste 525
Playa Del Rey, CA 90295

3704
3705 3725
BUY • SELL • LEASE

Call Toll-Free
800 532-7532
In Minnesota Call 612/944-9161

Centron DPL Company
Member CDLA

Your business problems need not be terminal

COMPUTERWORLD, the nation's #1 computer trade newspaper has the #1 cure for your business needs - its Classified pages.

All the remedies are there:

- finding computer professionals for you
- finding you a job
- buying/selling/leasing your equipment
- securing bids and proposals
- announcing seminars & conferences
- advertising available real estate
- advertising your computer time & services

At \$11.55 per line (\$161.70 per column inch), you can put an end to your troubles. The minimum size ad is 1 column x 2 inches (\$323.40). Send us either camera-ready material or clean, typewritten copy (enclose a layout if you wish) and any artwork, borders, or logos you want to use. We will put your ad together according to your specifications. Or you may call one of our ad-takers who will take your copy and advise you on the size and cost of your ad.

All materials should be sent to:

COMPUTERWORLD
Classified Advertising
375 Cochituate Road, Box 9171
Framingham, MA 01701-9171

Get on the road to recovery! Call us at 1-800-343-6474 (in Mass., 617-879-0700) to give your ad over the phone, reserve space, or request a rate card.

BUY SELL SWAP

BUY SELL SWAP

BUY SELL SWAP

BUY SELL SWAP

BUY SELL SWAP

S/34's

Printers
Modems
Tapes
CRT's

Upgrades

• magazine
• memory
• disk & features

call
800-828-4227
in Va. (703) 642-1950

CARLYN

COMPUTER SYSTEMS
5105Q BACKLICK ROAD, ANNANDALE, VA 22003

Here's Everything You Always Wanted From Data General. But Couldn't Get.

We buy, sell and swap Data General gear of all kinds—processors, peripherals, storage, communications, etc. But we're also authorized distributors for higher-performance DG-compatible equipment like Spectralogic controllers and C. Itoh and NEC printers, as well as for CDC, Fujitsu, Zetaco, MICOM, FACIT, Data Products and Kennedy.

We've got field service at a fraction of DG's prices. And depot service with immediate replacement of defective parts. As well as custom software on request.



Call or write Hanson Data Systems
60 Brigham St., Marlboro, MA 01752
(617) 481-3901
Outside Mass. (800) 225-9215

HANSON
DATA SYSTEMS, INC.

Data General's Only Single-Source Second Source.

IBM SPECIALISTS

SELL • LEASE • BUY

S/34 S/36 S/38
3741 3742

- New and Used
- IBM Maintenance Guaranteed
- All Peripherals
- Immediate Delivery
- Upgrades and Features
- Completely Refurbished

800-251-2670

IN TENNESSEE (615) 343-7011



CMA
COMPUTER MARKETING
of America, Inc.

P.O. BOX 71 • 610 BRYAN STREET • OLD HICKORY, TENNESSEE 37138

**We Buy & Sell
DEC
Systems
Components**

call: 713
445-0082

Original
computer
resale

600 Kenneth Ste C22
Houston, TX 77060

Sell IBM

S/134
38 **UPGRADES**
Lowest Prices

Call Collect
404-475-7507

36

DATAMARC

785 Branch Drive
Alpharetta, GA 30201

We Pay Highest
Prices For S/34's

**DEC
HOTLINE**
1-800-221-6318

VAX
M11, 730, 750, 780, 785
MDP II
11/23, 73 11/34, 44, 84
PERIPHERALS
Fixed & Removable
Drives, Tape Drives,
Communications
TERMINALS
VT220, VT100, LA120,
LA210, LA50

DATAWARE
your one-stop destination

INSTANT QUOTES
IMMEDIATE DELIVERY
NATIONAL SERVICE

1-800-221-6318
FREE CATALOG

Dataware

30 Bay St., Staten Island, N.Y. 10301
(718) 447-4911

DEC, VAX, RDP11 are registered trademarks of Digital Equip. Corp.

yes

WE WILL SAVE YOU MONEY
WE WILL GIVE YOU QUICK DELIVERIES
WE WILL CONFORM TO YOUR SPECIFICATIONS
WE WILL PROVIDE YOU WITH QUICK QUOTATIONS
WE WILL GUARANTEE ALL EQUIPMENT
WE WILL BE WAITING FOR YOUR CALL
WE WILL WORK HARD—WE WANT YOUR BUSINESS

CALL US... WE'LL TELL YOU HOW

WE BUY • SELL • LEASE
34 • 36 • 38 • SERIES 1 • 4331-4381
ALL PERIPHERAL EQUIPMENT
ALL UPGRADES

SOFTWARE & DATA COMMUNICATIONS CONSULTING

CALL: 800-238-6405

IN TN: 901-372-2622

IN NC: 919-884-0879

CB

COMPUTER BROKERS INC.

2978 SHELBY ST.
MEMPHIS, TN 38134

"SINCE 1974"



WE HAVE
AFTER-SALE
SERVICE
AVAILABLE
NATIONALLY

• Buy • Sell • Lease
Up to 40% SAVINGS on

IBM. Displaywriters

Guaranteed Acceptable
for IBM Maintenance
FEATURES & UPGRADES
5215-5218-6361

SYSTEM /23 DATAMASTERS

5670 PRINTERS

5525 OFFICE SYSTEMS

5219-5253-5258

SYSTEM/34/36

CDB FINANCIAL, INC.

3520 DILIDIO ROAD

DALLAS, TEXAS 75228

214-324-3491

Member: NMDA, CMAA

**Providing
the BEST
& BETTER
WAY.**

ECONOCOM-USA IS PART OF
THE ECONOCOM CORPORATION
A WORLDWIDE LEADER IN THE
DISTRIBUTION OF COMPUTER
RELATED PRODUCTS AND
SERVICES. OUR GLOBAL
STRENGTH ENABLES US TO
PROVIDE AN EXTREMELY HIGH
LEVEL OF CUSTOMER SERVICE
THROUGH OUR OFFICES
LOCATED ACROSS THE
UNITED STATES AND EUROPE
IN MANY INSTANCES, WE'RE
RIGHT IN YOUR OWN BACK YARD.

WE OFFER...

• THE COMPLETE IBM® PRODUCT LINE,
INCLUDING S/36, S/34, S/34 PC, SERIES/1,
4380, 3080, 3090, PLUS ALL ASSOCIATED
TERMINALS

• OTHER COMPUTER AND
COMMUNICATIONS EQUIPMENT
INCLUDING IBM® PLUS-COMPATIBLES,
AT&T® AND BURROUGHS®

• BUY-SELL-LEASE-RENT OR USED WITH
COMPLETE FINANCIAL SERVICES

• SERVICE PLUS COMPUTER MAINTENANCE
PROVIDED BY THE IBM-TRAINED FIELD
ENGINEERS AT ECONOCOM
MAINTENANCE COMPANY, INC.

• THE ECONOCOM FIBER-OPTIC LINE OF IBM®
PLUS-COMPATIBLE EQUIPMENT

PLUS...ECONOCOM CONTINGENCY
SERVICES: A COMPANY WHICH SPECIALIZES
IN CONTINGENCY PLANNING SERVICES AND
DISASTER RECOVERY CENTERS FOR IBM®
SYSTEM/38 INSTALLATIONS.

At ECONOCOM-USA, we provide you with the BEST
products and services available today...a BETTER WAY.
Please contact our office nearest you for specific
examples.

ATLANTA	CHATTANOOGA	HOUSTON	LOUISVILLE	NEW YORK
(404) 399-4232	(415) 477-4883	(713) 789-8888	(502) 399-1376	(212) 422-1441
BIRMINGHAM	DALLAS	KANSAS CITY	MEMPHIS	OKLAHOMA
(205) 823-6548	(214) 891-3182	(913) 491-9999	(901) 747-9130	(800) 747-9416
BOULDER	DALLAS	LITTLE ROCK	MIAMI	RALEIGH
(303) 449-1958	(214) 254-6543	(501) 234-4342	(386) 755-4848	(800) 238-3098
CHARLOTTE	DENVER	LOS ANGELES	MADISONVILLE	TULSA
(704) 523-5588	(303) 895-1511	(714) 852-0831	(615) 286-7819	(918) 493-5815

IN ADDITION, THE ECONOCOM CORPORATION HAS 31 OFFICES THROUGHOUT EUROPE.



ECONOCOM-USA, INC.
845 CROSSOVER LANE
MEMPHIS, TN 38117
800-238-3098
OR 901-767-9130

IBM SYSTEMS, PERIPHERALS, UPGRADES

**SYSTEM 36
SERIES/1
SYSTEM 38
SYSTEM 34
PC, XT, AT
4300/3080
DISPLAYWRITERS
DATAMASTERS S/23**

BUY, SELL, LEASE **612/894-2200** BUY, SELL, LEASE
ALSO: FINANCE & OPERATING LEASES FOR ALL SYSTEMS & PERIPHERALS.

**Valley Computer
& Financial, Inc.**

12205 Nicollet Avenue, Burnsville, MN 55337

LEAS-PAK INTERNATIONAL

**BEST PRICE
BEST SERVICE
BEST DELIVERY**
WHETHER YOU BUY, SELL, OR LEASE

PRINTERS
AND
CRT'S

SYSTEM 36 PROCESSORS
AND
DISK UPGRADES

LARGE
INVENTORY

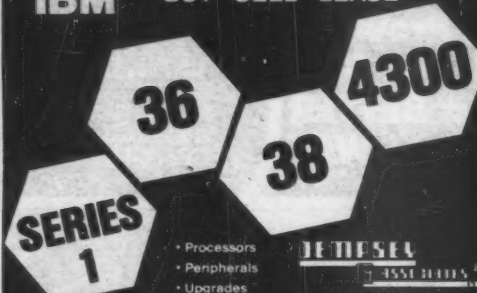

S/34
AND
S/38

LEASE
FINANCING



P.O. Box 768, Hurst, TX 76053 In Texas call 817/288-0023

1/800/LEAS-PAK

BUY SELL SWAP		BUY SELL SWAP		BUY SELL SWAP		BUY SELL SWAP		BUY SELL SWAP						
IBM BUY · SELL · LEASE  <p>SERIES 1</p> <ul style="list-style-type: none"> Processors Peripherals Upgrades <p>DETERMINE YOUR NEEDS</p> <p>(714) 847-8486</p>					FOR SALE SYSTEM 38 MODEL 6 AVAILABLE JUNE 1, 1986 CPU 4 Megabytes Communications Disk Drive Attachments Tape Drive Attachments DISK DRIVE 3370 Model A11 TAPE DRIVE 3430 Model A01 All Equipment Currently Under IBM Maintenance. Call 914 664-7800 Ext 268 Allen Franzman					3081 - K 32 - 24 Channels - Performance Improvement features - Available for sale or lease - Serial number and physical inspection available USER INQUIRIES ONLY, PLEASE  NATIONAL  Computer Equipment Corporation 200 Maple Park Boulevard Maple Park Office Plaza S. Clear Shore, Michigan 48061 FOR MORE INFORMATION, CONTACT J. Moduszewski 1-313-774-7400 1-800-NAICOEC				
<h1>BIDS & PROPOSALS</h1>														

3430-A1 Tape & Ctl Unit 4245 200 LPM Printer	4341's 4381's Sale/Lease	Printers 3203 3211 1403 3800 4248 4245 3262 3289 3287 Immediate Delivery
Control 3680 3274 3803 3276 Display Monitors 3278 3178 3278 3178	DASD 3380 3375 3370 3350 3344 3310 Immediate Delivery	TAPE DRIVES 3420 3430 3410 3480 Immediate Delivery

We Buy, Sell & Lease IBM Processors and Peripheral Equipment

Computer Marketing Inc.
 P.O. BOX Q, MARGATE, NJ 08402-0430
609/823-6000
 Contact/Bernie Gest
 Telex: 5106012293

 Established 1980

WANTED:
VAX 780 or 785
 and
WANG VS 90 or 100
 End user prefers to buy from end user. Contact:
 Ian Levit
 (703) 689-1088, ext. 306

City of Albany, GA
SEALED BID SALE
 Bid Opening 5/8/86
 (912) 431-3211
IBM S-38-8 CPU
 W/3262 AO1 Printer,
 8MB Memory, 148 Port,
 4 Comm. Adapters

STATE OF CONNECTICUT
 D.A.S. BUREAU OF PURCHASES
 REQUEST FOR PROPOSAL (RFP29)
 REFERENCE: RFP R629
 Vendors interested in responding to a forthcoming RFP for "Section 6" Rental Housing Assistance Payment Program (Checkwriting and ancillary reports). Project must be completed and operational on vendor's equipment on 7/1/86.
 Interested vendors must contact:
 Gordon L. Partridge, Director
 State Of Connecticut
 Resources & Facilities Planning
 340 Capital Avenue, 1st Floor
 Hartford, Connecticut 06108
 (203) 566-3304
 John W. Otterbein
 Deputy Commissioner

AUCTIONS

MAJOR PUBLIC AUCTION

MULTI-MILLION DOLLAR VALUATION

By Order of
US LEASING

Large quantities of data processing/word processing equipment, computer peripherals, phone systems, copiers, office equipment and more from major manufacturers, including DEC, Wang, IBM, NCR, Apple, Exxon, Lanier, Olympia, Sharp and others!!!

Friday, May 2nd at 10am
 Inspect Thursday, May 1st
 9-4pm and morning of auction.
**608 Folsom Street,
 San Francisco**

Partial listing to include DEC VAX 11/780 (call for spec sheet), PDP 11/34, quantities of disk drives, printers, and terminals including DECmates, DECwriters, W/778's, VT778's, VT100's, and LQ printers; large inventory of WANG word processing systems and peripherals including wide variety of Wang printers, terminals, and workstations; IBM 3814, 3350's, 5291's, IBM Displaywriters, assorted IBM printers and terminals; NCR 8200 series computer and peripherals; Lanier No Problem word processing systems; Pacer Series 100-400 phone systems; Apple II+ and Apple III PC systems and peripherals; office typewriters from IBM, Olympia, Qyx and others; miscellaneous mailing machines, copiers, and much more!

Call for a free illustrated brochure.

ROSS-DOVE
 AUCTIONEERS SINCE 1937
COMPANY, INC.

951 Marineland Blvd., Suite 260
 San Mateo, CA 94404, (415) 571-7400
 TLX 580-400-6722, FAX (415) 572-1502
 CA License Numbers 616, 1120, 1265, 1277
 MILLARD, ROSS & KIRK DOVE, Principals

Asset Convention
 Consultants to Corporate America.



COMPUTERWORLD CLASSIFIEDS WORK!

- Position Announcements
- Buy Sell Swap
- Software For Sale
- Software Wanted
- Time & Services
- Real Estate
- Business Opportunities
- Seminars/Conferences
- Bids and Proposals

It's easy to advertise in COMPUTERWORLD. If you don't have an advertising agency to supply us with copy, layout and order, or a camera ready mechanical, stat or film negative of your ad, just call our ad-takers at 1-800-343-6474. They will be glad to take your ad and typeset it in available fonts at no extra charge. If you have lengthy ads that require logos and artwork, just send a clean typewritten copy of your ad to the classified advertising department at COMPUTERWORLD (telecopier service is available); note the ad size you want; and, if you want your company logo to appear in your ad, please be sure to include a camera-ready copy with your insertion order. You should also supply any special borders, headlines and artwork that you want in your ad. Our Art Department will follow your suggested layout as closely as possible if you wish to send one.

**Ad closing is every Friday,
 6 working days prior to issue date.**

Rates: Open rate is \$161.70 per column inch. Columns are 2" wide. Minimum ad size is 2 column inches (1 column wide by 2 inches deep), and costs \$323.40 per insertion. Additional space is available in half-inch increments. Some sample sizes and costs are shown.

1 col x 4" - \$ 646.80
 2 cols x 4" - \$1293.60
 2 cols x 5" - \$1617.00
 2 cols x 8" - \$2587.20

Discounts are available when you run more than 35 column inches of advertising in a year anywhere in Computerworld. Box Numbers are available, \$15.00 per insertion.

To reserve space for your ad, or if you'd like more information on Classified advertising in COMPUTERWORLD, call our office nearest you.

**Boston - (617) 879-0700
 (800) 343-6474**

**San Francisco - (415) 421-7330
 Los Angeles - (714) 556-6480**

**TELECOPIER SERVICE - (617) 879-0700
 or (800) 343-6474 ext. 410 or 451**

The Bulletin Board

Buy • Sell • Lease

Buy • Sell • Lease

Buy • Sell • Lease

Buy • Sell • Lease

PRIME

LARGE SELECTION OF USED PRIME COMPUTER SYSTEMS... SAVINGS TO 50%
Peripherals also available
1st SOLUTIONS, INC.
2001 EAST CAMPBELL AVE.
PHOENIX, ARIZONA 85016
(602) 957-0999
ASK FOR DON OR MATT

TBI - the oldest, largest and most experienced supplier of third party peripherals, memories and controllers for Prime users.

BUY • SELL • LEASE • RENT
NATIONAL 800-222-DISK
FLORIDA 800-421-4135
Timesharing Services, Inc., 4080
Woodcock Dr., Jacksonville, FL 32207

WANG

BUY • SELL
MVP/LVP • OIS • VS • PC
SYSTEMS IN INVENTORY
VS-45 • OIS • VS-100
GENESIS
EQUIPMENT MARKETING
GEM
(602) 277-8230

THE RIGHT EQUIPMENT
RIGHT NOW
AT THE RIGHT PRICE
ICA...THE RIGHT CHOICE
founded 1981 by ex-Wang employees
(404)977-4388 or (800)241-3159

Buy • Sell
Used
Wang Equipment
Guaranteed For Wang Maintenance
Holson Associates Inc.
2470 Windy Hill Road, Suite 253
Marietta, GA 30067
Call: Richard Holson
or Carole Benson
(404) 880-1700

WANG

PRICED LOW TO SELL
WHILE THEY LAST
NEW 5-PORT WANG PC
WITH 10MB DISK WORD
PROCESSING, MONITOR,
KEYBOARD
\$3,290.00
CALL 217-523-7225

DATA GENERAL

NEW D.G. C.R.T.'s
D214.....\$95 D411.....\$85
D215.....\$75 D461.....\$125
Lowest prices on all MV-2000s, DESK-
TOPS, MEMORY BOARDS & MULTI-
PLEXERS

ALPHA-KENCO, INC.
1-800-44-KENCO
New York State: 718-633-2800
Formerly Kenco Data Systems

BURROUGHS

BUY SELL LEASE
BURROUGHS
B-20 to B-7900
SPECIAL 207 DISK
(10 Units)
B900 DISK PACK (206 Style)
Subsystem
DEPOT
MAINTENANCE
Computer Provisions
(216) 248-7878

BURROUGHS

BURROUGHS A-9-F

12 Meg Memory
Available 6-15-86

B6930

\$40,000
3.1 Meg Memory
Available Immediately
Art Surowiec
Gordon Food Service
P.O. Box 1787
Grand Rapids, MI 49501
(616) 530-7000

BURROUGHS

BUY • SELL • LEASE
Systems • Processors • Peripherals

• All BX800 & BX900 Series
• All "A" Series
• All Peripherals
• All Terminals
• All Convergent Technology

"April Specials"

B6930-B9300-B1985
B9246-21 & 20 Printers
B9246-6 & 3 Printers
206 Disk Drives
Depot Maintenance
820-821-822-825-828 etc.
Universal Financial
1-800-558-5656

Call
to place
your ad
today
(800) 343-6474
(617) 879-0700

DEC

FIRST ON DEC FOR SALE

DEONA-M.....\$ 875
DEUNA-AA.....2,800
DFOS-RC.....475
DFM16-AC.....3,600
DMP11-AD.....2,975
DR11-W.....1,350
H9652 MA.....2,450
LA120 BA.....1,250
PRO350 D2.....2,700
RA81-AA.....14,000
RA81-ED.....42,000
RP07-AA.....New 12,000
RUA81-EA.....45,320
VT220.....795
VT240.....1,680
VT240 DEMO.....1,275

WE ALSO BUY VAX HARDWARE!!

CALL
(800) 222-ICEX
(303) 666-5400
ICEX, INC.
740C SOUTH PIERCE AVE.
LOUISVILLE, CO 80027

Merida Trading Group
New

RA81AA.....\$12,500
RA60AA.....\$12,500
RA81JA.....\$52,000
750 Memory.....\$1,450
780 Memory.....\$1,450
MS11TB.....\$1,300
VAX 750 CPU Used.....Call
VT220 A, B & C Recon.....\$1,300
Used 750/780
Memory.....\$1,000
H9642 Cabinets (2).....\$1,000
155 New Boston Street
Woburn, MA 01801
(617) 933-6790

DEC NEW & USED

BUY • SELL • EXCHANGE

Systems • Processors • Memory
Options • Peripherals • Modules
LAKEWOOD COMPUTER CORP.
452 Link Lane
FL Castle, CO 80524
(303) 493-4400

DEC

DEC SPRING SPECIALS

11/34A CPU Set.....\$750
11/44 CPU Set KD11Z.....\$3,900
DL11-W.....\$185
FPF11.....\$875
FP11A.....\$695
HS25X-BA.....\$4,450
KK11-A.....\$475
MF20-M.....\$4,400
MS11-LD.....\$375
MS11-MB.....\$375
MS630-BA.....\$2,900
MSV11-PL.....\$900
VAX 4MB MS780-JD.....\$7,900

Call Ray at OEI, Inc. (617) 275-6800

BUY • SELL • TRADE

11/84-BA LA120-BA MSV11-PL
1170 CPU sMS11-PB MSV11-QA
11725 MS750-CA RA81-AA
BC26V-50 MS780-CH RL1V2
DEONA-M MS780-FA TU80-AA
W7140-AA MSV11-JC U2450-A
NEW YORK COMPUTER EXCHANGE
(516)752-8666 (800)645-9109

LA120 (Recon.) \$795.
VT220 (New) \$825.
DECmate II (New) \$2295.
KDF11BA (New) \$425.
Digital Computer Resale
(713) 445-0082

MISC.

CODEX NETWORK COMM EQUIP
For Sale - Private Firm
MUT • 6043's, 6031's, 6005's
MODEMS: MX2400's, CS9600's
DNCS 400 Network Mgmt. System
Includes: Mini Computer & Peripherals
Also: 212 Dial Modems
Call Jim Koltzman
(509) 838-9480

NEW & USED

RAISED FLOORING

Immediate Delivery
Quality Installation
RAISED COMPUTER FLOORS
One Charles Street
Westwood, NJ 07875
(201) 666-8200
Telex #13-5076

IBM

IBM

3420-6

Available Now For Sale Or Lease

3803-2

Available Now For Sale Or Lease

4341-12

Available Now -

One For Sale Or Lease

One For Lease Only

Call Pete -

(313) 254-2850

The Vargo

Companies

48945 Van Dyke

Utica, Mich. 48087

34-36-38

Systems,
Peripherals & Upgrades
Guaranteed Quality Service
Special Reduced Prices
New and Used Equipment
Carlyn Computer Systems, Inc.
800-628-4227
In VA (703) 642-1950

IBM

S/38 S/36 S/34 SERIES 1

BUY • SELL • LEASE

Systems, Peripherals & Upgrades

Source Data Products

408/425-7333 800/328-2689

SERIES/1

BUY • SELL • LEASE

New, Used, CDC, Features

Xerxes Computer Sales

800/328-3884 612/936-9280

SYSTEM/36

FOR LEASE

512K - 400 MB

\$1,200/mo - 3 years

Other Models Available

SOUTHWEST COMPUTERS

512-828-1239

For Sale Or Lease

3203-5

Bluebonnet

Computer Company

(512) 926-3900

IBM

3178, 3179,

3278, 3274

All Other IBM Units Available

Call Penny 800/426-4341

In CA 408/241-3677

Marketex Computer Corp.

S/34 S/36 S/38

BUY • SELL • LEASE

Need Used 36's & 38's

Xerxes Computer Sales

800/328-3884

612/936-9280

SALE/LEASE

4331-KJ2

Will Modify To Suit

Peripherals Available

Call Bill Heggen

(914) 238-9631

Computer Merchants Inc.

Want To Buy

System 38

(713) 627-7117

SALE/LEASE

3203-5

3262-3

Call Matt Blaustein

(914) 238-9631

Computer Merchants Inc.

S/36

Disk Upgrades

Immediately Available

(713) 627-7117

(212) 279-4467

SALE/LEASE

S/38

Model 18 - 4Mb

Model 6 - 4Mb

Immediate Availability

Call Ron Gibb (914) 238-9631

Computer Merchants Inc.

Fox Computer Sales

Buy • Sell • Rent • Lease

IBM

DP & GSD

W.T.B.: Used Equipment

(216) 449-5205

IBM

USED IBM MODEMS 3865-2 \$2,795

with SNUB

Dealer Pricing Available

BUY • SELL • LEASE

All DATACOM Equipment

DATA PROCESSING SCIENCES

800-943-7636 (513) 981-0778

For Sale

IBM Communicating

Terminal 3776 Model 2

400 LPM Printer

Features 1461, 1461,

3701, 4901, 1390

Contact Michael Howrey

(314) 878-2005

HONEYWELL

HONEYWELL SPECIALISTS

LEVEL 6 DPS 6 SERIES 16

The Recognized Leader

In Honeywell Minicomputer

Sales And Support

• Complete Minicomputer Line - New

and Used

• All Peripherals and Terminals

• Upgrades and Features

• Depot Repair Capability

• Honeywell Maintenance Guaranteed

• Immediate Delivery - Low Prices

• Complete Refurbishment

817-393-6539

TRW 710-347-7574

Boudreau Computer Services

Since 1974

100 Bearfoot Rd.

Norborough, Massachusetts 01532

HONEYWELL DPS 8

FOR SALE

Includes:

• CPS - 8124 - DPS 8/20

• CR2 - 301 - Reader

• MTC - 501 - Tape Controller

• MTH - 502 - Tape Drive

• PRT - 401 - Train Printer

• MFP - 6000 - Multi-functional

Processor

• DCU - 6661 - Data Net

• MSP - 0512 - MSP Dual

Channels

• MSU - 0402 - 100 MB Disks (2)

• MSU - 0501 - 400 MB Disk

Call Al Meyerhoff

(813) 661-0444

LEVEL 6 AND DPS6 USERS

NEW AND RENEWED ORIGINAL

Systems - Peripherals - Cables

Memory - Controllers - CRT's

Guaranteed Honeywell Maintenance

Large software staff

C.D. Systems Inc.

1-800-333-2310

HEWLETT

PACKARD

HP3000

BUY • SELL • RENT • LEASE

Processors • Peripherals • Systems

Disk Drive Special

7925S

120 Megabyte Slave Disc Drive

\$3,250

Offer Expires May 15, 1986

Immediate Delivery

Subject to Availability

Guaranteed to Qualify

for HP Maintenance

ConAm Corporation

(800) 643-4954 (213) 829-2277

HP 1000 • 3000

Systems & Peripherals

Buy & Sell Worldwide

ENCORE

(213) 452-9117

Telex 756927

ORDER FORM COMPUTERWORLD BULLETIN BOARD

Issue Date: Ads can be accepted up until the Monday preceding the issue desired. Computerworld comes out every Monday.

Classifications: Most ads will be classified according to the brand of equipment that is being bought or sold. These classifications include Burroughs, Data General, Digital/DEC, Hewlett Packard, Honeywell, IBM, NCR, Sperry Univac, Salvage, Terminals, Misc. Systems and Miscellaneous.

Copy: Copy sent in via the mail or telecopier (telecopier extensions are 410 and 451) should be clearly typewritten. Ads may be given over the phone to our team of ad takers. The standard size is 1 column by 1 inch deep. These units may be combined to form larger sized ads. Describe the equipment very briefly, give the price and the name of the person to contact. All ads will be set up using a standard format. No

Starting With Our May 26 Issue

Computerworld's New

MICRO DIRECT SHOPPER

Direct marketers of micro/PC products now have the opportunity they need to sell into large and mid-sized firms that buy and use micro/PC products by the thousands. Reach them directly through the pages of Computerworld's MICRO DIRECT SHOPPER display classified section starting with the May 26th issue. Advertisers must offer to sell their products and services by mail or phone orders only.

Control of information systems in the firms that Computerworld reaches rests largely in the hands of MIS/DP organizations. It's a huge market opportunity for you.

Don't Take Our Word For Who's In Control

Large and medium-sized organizations (100 employees or more) account for 72% of the microcomputer installed base. And Computerworld's audience of MIS/DP decision makers is your key to this market. But don't take our word for it.

"We've had an enormous turnaround in our thinking. We tried to sell around the MIS departments, and that was foolish. We were wrong before; we underestimated the MIS world..."

Steve Jobs, Chairman of Apple Computer, Inc.
From the San Francisco Examiner
January 23, 1985

A survey of the Applied Computer Research list of top computer executive found that "67% of companies with micros had specific groups or committees with responsibilities for controlling them. In 82% of the cases, MIS managers had the lead role in those groups."

From Fortune's Special Advertising Section
Personal Computing for Business
January 21, 1985

"What we found is a trend — actually, it's occurring a little sooner than we had expected — but there's a greater incidence of (computer) purchases being made by repeat buyers...The MIS/DP manager has regained much of the control over the PC acquisition; this is key, of course, not only to ourselves but to other PC manufacturers."

Jim D'Arezzo, Vice President of Corporate
Communications, Compaq Computer
From Computer & Electronics Marketing
December 1985

"A survey (conducted by PA Computers & Telecommunications, Inc.) of 700 large industrial companies shows that about 75% now have their data processing departments oversee personal-computer purchases, up from only 25% a year ago."

The Wall Street Journal
September 5, 1985

For more information on Computerworld's MICRO DIRECT SHOPPER classified display advertising section, please call the sales office nearest you.

East/Midwest
Hajar Associates, Inc.
28 Lancelot Court
P.O. Box 345
Norwood, MA 02062
(617) 769-8950

West
Healey & Associates
300 Broadway, Suite 20
San Francisco, CA 94133
(415) 421-7330

Home Office
Cindy Delany
Computerworld
375 Cochituate Road,
P.O. Box 9171
Framingham, MA 01701-9171

SOFTWARE FOR SALE

TIME & SERVICES

SOFTWARE SELECTION SERVICE

Looking for the software package that will meet your needs?

Secure the expertise that will guide you in selecting what's right for you.

"CHOICE NOT CHANCE"

Call us for further information
(203) 635-0346

**SELL
YOUR
SOFTWARE
IN
THE
CLASSIFIED
PAGES
OF
COMPUTERWORLD**

maxell.
3 1/2" 5.25" **\$0.64**

OTHER BRANDS AS LOW AS \$0.54

**BULK DISKETTES-QUANTITIES
OF 500 with TYVEK SLEEVES**

**RIBBONS (All Brands)
EPSON MX 70/80 \$4.20**
Prices based on quantities of 48

C.O.D. C.O.D.

800-222-0490
201-462-7626 in N.J.

MECHSOFT P.O. Box 710,
Freehold, N.J. 07728

SUPER ORACLE™ REPORT WRITER

Create complex reports from your Oracle database with easy one step process. Report format and logic very flexible. Versions for VAX/VMS, IBM PC. Demos available. Contact Stern Consulting, P.O. Box 21171, Cleveland, OH 44121, (216) 397-0551.

Oracle is a trademark of Oracle Corporation

ICOTECH Innovative Computer Techniques DATA PROCESSING SERVICES

IBM 3081 DEC-10 VAX 8600

- Batch Processing
- Timesharing
- Microfilm
- Public Network Access
- Laser Printing
- Optical Mark Reading

Introducing ...

the ICOTECH

Health & Safety

Information System

Route 205 • Raritan, N.J. 08869

201-485-3400 • Contact: Joyce Raganek

COMPUTER TIME RENTAL

IBM 4331

DOS/VSE - ICCF

All Shifts Available

3370 Disk, 3420 Tape

800/1600 Density

1403-N1,

2540 Reader/Punch

Reasonable Rates

Contact: Al Palmo

Restamatic Data Services

(212) 997-1439

Littton Computer Services FULL SERVICE COMPUTING BM, ARJE, S, ALE MAINFRAME

EXTENSIVE SOFTWARE SERVICES:

- MVS
- VM/CMS
- TSO/SPF
- CICS
- DOS
- RAMS II
- GRAPHICS
- MICRO/MAIN
- FRAME LINK
- DBMS
- PROFS

NETWORK ACCESS

RJE

STATISTICAL PACKAGES

SUPERIOR TECHNICAL SUPPORT

HIGHLY COMPETITIVE RATES

NEW YORK (212) 972-7880

CHICAGO (312) 298-9305

WASHINGTON (703) 471-9200

OR FOR MORE INFORMATION

WRITE OR CALL:

8 Kingsbridge Road

Fairfield, New Jersey 07006

Attn: Dominick Cimminello

(201) 575-2800

DATA CENTER SERVICES

- MILLENNIUM
- OS/MVS/SP
- VM/370
- DOS/VSE/SCP
- CMS
- NOMAD2
- TSO/SPF
- CICS
- IMS/DBDC
- RJE
- TELENET ACCESS

Info Center Products

Access By Micros

EXCELLENT SERVICE LEVELS

COMPETITIVE RATES

VOLUME DISCOUNTS

BURNS COMPUTING SERVICES, INC.

MIDWEST: EAST COAST:

312/961-5280 215/388-3800

212/432-1181

MILLENNIUM is a registered trademark of McCormack & Dodge

NOMAD2 is a trademark of D&B COMPUTING SERVICES, INC.

VAX TIME

MOST MAJOR LANGUAGES AVAILABLE
ELECTRONIC MAIL CAPABILITIES
ADVERTISING MANAGEMENT
FLEET MANAGEMENT
ACCOUNTING, PAYROLL
PROGRAMMING SERVICES AVAILABLE
CHOOSE THE PLAN BEST FOR YOU:
A @ 5¢ CPU SEC & \$2 CONNECT HR.
B @ \$12.00 PER CONNECT HR.
C @ \$800.00 MONTH & 10 MB DISK
NO CPU CHARGES ON PLAN B & C

AVAILABLE NATIONWIDE
VIA TELENET
HIDCON CORPORATION
(714) 998-6041

VAX AND PDP-11 DEVELOPMENT TIME

NO KLOCORE TICK CHARGES NO CPU CHARGES

Omni computer.

\$7/\$14

RCIS E VMS

PER HOUR

CONNECT TIME

BUDGET BYTES™

212-944-9230

Omnicomputer, Inc.

1430 Broadway, New York, N.Y. 10018

POSITION ANNOUNCEMENTS

DATA PROCESSING OPPORTUNITY IN VIRGINIA

Charlottesville based law publishing subsidiary of Macmillan, Inc. is currently expanding its D/P staff. The following opening is available on a team developing an electronic publishing system involving sophisticated data base operations and an elaborate distributed processing network:

D/P PROJECT MANAGER/TEXT ANALYST

We are seeking a unique individual to fill a newly created position responsible for the successful technical implementation of a state-of-the-art electronic data base publishing system. This position requires broad hands-on experience with a large scale IBM mainframe system running MVS, a background in text data base systems (preferably INQUIRE), PL/1 and CICS. Also highly desirable is experience with C, IBM, PC/AT's and photocomposition systems.

This position also requires project management skills including experience with large scale DP projects (\$2M+), project methodology, project planning, implementation and tracking, and management of project team individuals.

Qualified individuals should possess a Bachelor's Degree or equivalent (MBA considered a plus).

As a subsidiary of Macmillan, Inc., we offer competitive salaries, an excellent fringe benefits package and a high quality of life living area.

Principles only reply with resume including salary requirements to:

Reginald B. Ryals
Director of Administration
The Michie Company
P.O. Box 7587
Charlottesville, VA 22906

EOE M/F

**THE
MICHIE COMPANY**
LAW PUBLISHERS SINCE 1851

SYSTEMS PROGRAMMER

Sutter Health Systems offers exciting opportunities within our growing MVS/XA 3081 Data Center for experienced MVS or CICS Systems Programmer.

Successful candidate must have experience with IBM/MVS Systems including system generation and maintenance, and assembler language. DL/I, NCP, & VTAM, experience highly desirable. BS degree in computer science and/or equivalent education and experience.

In addition to an ideal California location, convenient to coast and mountains, Sutter offers a competitive salary and comprehensive benefit package. Please send resume to Jennie Piper, Recruiter, Sutter Community Hospital, 3000 L Street, Suite 104, Sacramento, CA 95816. EOE M/F/H

PROGRAMMERS

**COBOL PLUS MSA P/A
\$35,000**

Mfg firm is looking for a COBOL P/A with 2+ yrs & expertise in MSA payroll. Full benefits & nice midtown, NYC location.

ROBERT HALF
OF NEW YORK, Inc.
520 Fifth Avenue
New York, NY 10036
212-221-4500

SYSOREX INFORMATION SYSTEMS, INC., is recognized as a leader in the development and management of large, integrated computer and communication systems. We are a California company now expanding our operations in the WASHINGTON, D.C. area and are currently seeking a talented professional to assist in implementing a new, nationwide IBM-TPF-based communications replacement system.

SYSTEMS ENGINEER

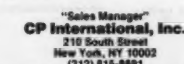
Minimum of 5 years experience in development programming and a minimum of 3 years experience in IBM Assembler language and a working knowledge of ANSI COBOL. Must have knowledge of quality assurance testing practices and familiarity with real-time systems concepts. Minimum of 2 years MVS experience is required.

SYSOREX provides medical, dental, life insurance and disability insurance at no cost to employees or their families, plus profit sharing. Qualified candidates should send their resume, with current salary to Professional Staffing, Dept. CW-CRS, SYSOREX INFORMATION SYSTEMS, INC., 3 Skyline Place, 5201 Leesburg Pike, Falls Church, VA 22041. An equal opportunity employer. INDIVIDUALS ONLY, PLEASE.

SYSOREX

Sysorex Information Systems, Inc.

POSITION ANNOUNCEMENTS



POSITION ANNOUNCEMENTS

UNDX is a trademark of AT&T

1725 Jeff Davis Hwy. #408
Arlington, VA 22202
703-892-0212

1725 Jeff Davis Hwy. #408
Arlington, VA 22202
703-892-0212

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

NEW ENGLAND

BOSTON MGR. OF TECH SVCS.

If you manage a tech svcs. area w/IBM MVS & IMS technologies, you may qualify for this oppy. Our client is a Fortune 500 ind. leader and utilizes multiple 308X mainframes. Comp. pkg. includes \$63,000 base + bonuses & suburban loc.

BOSTON WANG VS COBOL

Dynamic software co. seeks talented tech contributor for lead role. Wang VS COBOL bkgrd. a must + pkg exp. a plus! You'll develop new fin'l. & mfg. sys. + be key resource w/this recog. leader. \$32,000.

BOSTON VAX FORTRAN P/A

Fin'l. svcs. industry ldr. seeks talented P/A w/communication skills to support sophisticated user base. FORTRAN a must, VAX/VMS a plus. Oppy. to learn investment svcs. & advance to proj. ldr. \$32,000.

HARTFORD SYS. PROGRAMMER IMS

CT multi-div. corp. creating new position to provide D.B. support to all IMS svcs. planning/install. Full reloc. Excellent growth oppy. Salary to \$45,000+.

HARTFORD PROJECT MANAGER

If you have 8+ yrs. D.P. exp. w/ current suprvy. bkgrd. in DDA applications, our fin'l svcs. client in CT wants to meet you! Full reloc. Salary to \$40,000.

PROVIDENCE PROJECT LEADER—WANG

Industry leader undergoing explosive growth seeks proj. ldr. for new app. devel. Environ. is WANG VS COBOL. Oppy. to join firm in hi-vis. role as it expands to record sales. \$30,000.

Gettysburg College has 2 immediate openings. The individuals in these positions report to the associate dean of educational services.

PROGRAMMER OPERATOR

Technical Support Specialist, involving the operation and maintenance of hardware and related equipment. This person is responsible for the day-to-day activities of all administrative computing equipment. Qualifications: 2-3 years experience in computing, preferably with Prime systems. Knowledge of hardware essential, good understanding of operating system fundamentals and some programming experience.

PROGRAMMER ANALYST

The person in this position is responsible for the day-to-day activity of the operating system, application software and database files. The programmer analyst participates in the development of plans responsive to administrative computing needs (including systems evaluation, analysis and design, programming and technical support). Qualifications: 3-4 years experience in computing, preferably in Prime information systems.

B.A. required. Appropriate work experience may be substituted for degree requirements. 12 month position. Attractive fringe, 11% hours from D.C.-Baltimore area. Send letter of application including salary requirements, resume, 3 letters of reference by May 2, 1986 to: Dr. Salvatore Colino, Associate Dean of Educational Services, Gettysburg College, Gettysburg, PA 17325. Gettysburg College is a selective liberal arts college related to the Lutheran Church in America; it is an affirmative action/equal opportunity institution. Women and minorities are encouraged to apply.

New England, Westchester & NY Metropolitan Area

PERMANENT &/OR INDEPENDENT CONSULTING

Programmer Analysts & Project Leaders Design & Development

—BANKING—
DEC VAX VMS BASIC 3-7 yrs exp.

—BROKERAGE—
Large scale systems, IDMS ADSO-CICS Min 3-7 yrs exp.

—BANKING—
Exp CICS, any Database, ADABAS a plus.

Call 212-398-9891 or submit resumes to: VP Systems Development, Hank Walsh Assoc., 16 W. 40 St., NY, NY 10018.

MIS DIRECTOR

A Salt Lake City based company with operations throughout the country is looking for a results oriented manager to take charge of a multi-vendor data processing environment with a staff of fifteen programmers, analysts, systems programmers, and operators. Major responsibilities will include overseeing the development and implementation of major new application systems.

Minimum Qualifications will include: Proven—successful—experience managing complex application systems installations/conversions. Strong overall knowledge of Data Processing Management, including proven development and project control systems. Bachelor's degree in a related field; and Excellent Communications Skills (oral and written).

Salary Level Open - Commensurate with experience. Send resume and salary history in complete confidence to:

PRICE WATERHOUSE

MIS DIRECTOR
50 West Broadway, Suite 800
Salt Lake City, Utah 84101

Director, Retail Operations - to direct technical efforts of company providing computer systems and software to retailers; manage operational requirements and monitor that industry standards maintain; establish plans for governing implementation of products; oversee development of communication package, general applications, design of vertical specifications and selection of development tools; oversee marketing of product line; oversee product and market testing; recruit technical staff and training of personnel; liaison functions; secure BETA test sites for product and liaise with industry specialists for certification of product. BS in Computer Science or equivalent required with 4 yrs experience or 6 yrs of project/programming mgr. Will accept 10 yrs experience as project/programming mgr. with out degree. Must be experienced in system design, application design and development, retail info systems, customer support and project mgmt. must have proven market research ability. Salary - \$40,000/yr. Apply with resume and proof of experience to Georgia Department of Labor, 2872 S. Cobb Drive, Smyrna, GA 30081, or to the nearest Georgia Job Service Center. Control #GA 5127960.

Systems Analysts

Need experienced Systems Analysts for progressive corporation in a fast growing area in New England. Should have good systems background with successful systems implementation record. Familiarity with financial and forecasting systems a plus. The environment is an IBM System 38 Model 40. Person must have good communication skills, ability to work with users, and good understanding of System 38 database architecture.

Application Programmer

Need experienced RPG III Programmer. Minimum three years experience with System 38 and good understanding of systems. M.I.S. Department is currently utilizing an IBM System Model 40 with considerable expansion planned in the future.

We offer excellent company benefits and good starting salary to the right individuals. Please send resume and salary requirements in confidence to:

Killington Limited, Killington, Vermont 05751, Attn: Personnel.

Software Engineers

TO FIND THE BEST JOB YOU NEED TO BE PART OF THE RIGHT NETWORK

Harris/Lanier, a leader in information systems technology, is assembling a world class team of software engineering professionals to support a major new development effort.

As a member of a select design team, you will work on one of the nation's most advanced communications networks developing integrated applications or device drivers for DOS and XENIX. You must possess 2-4 years software design experience using C, Unix*/Xenix and MS/DOS. Experience in implementation of or in depth exposure to graphics standards is highly desirable. Database or spreadsheet manager design/implementation also a plus. A BS in Computer Science, Math or Engineering is required.

You'll find that our R&D environment encourages your best ideas and provides ample opportunity for personal and professional growth. The compensation package includes an excellent salary, performance bonus and comprehensive company benefits. We're conveniently located in Northeast Atlanta. For prompt and confidential consideration, please forward your resume with salary requirements to Janice Grant, Harris/Lanier, 1700 Chantilly Dr. N.E., Atlanta, GA 30324. Or, call her at (404) 329-8004. No Agencies Please. An Equal Opportunity Employer. Permanent residency or U.S. citizenship required.

*Unix is a registered trademark of AT&T Bell Laboratories.

FOR YOUR INFORMATION, OUR NAME IS

HARRIS

H HARRIS LANIER

CONSIDER MICHIGAN

• IMS
• CICS
• DB2

• PC ASSEMBLER
• FOCUS
• DEC/VAX
• UNIX/C

MULTIPLE TECHNOLOGIES CORPORATION (MTC) is looking to expand its technical staff. We have a number of exciting projects to work on and we need additional skilled technicians. If you want to grow technically and possess any of the above skills, please call collect to (313) 353-2000 or send your resume to:

MULTIPLE TECHNOLOGIES CORPORATION

24370 Northwestern Hwy.
Southfield, MI 48075
E.O.E.

DIRECT CONTRACTS

N.Y., N.J., CONN., & I.

PRINCETON INFORMATION LTD.

Leading Consulting Company to \$550/day

ALL SKILLS WELCOME

• DB2
• X.25, SNA
• Radar Software
• PASCAL
• ADABAS
• IDMS (Conn)
• MVS Sys Prog
2 PENN PLAZA, NY, NY 10001
212-563-5030

VM SYSTEMS PROGRAMMER

Due to expanding needs, Schreiber Foods, Inc., the largest privately held cheese manufacturer with annual sales exceeding \$700 million, is currently looking for a VM Systems Programmer. This position is located at our corporate office in Green Bay, WI.

Major responsibilities will be to install, maintain and troubleshoot VM and related software in a state-of-the-art environment. We require a Bachelors degree and minimum of 4 years experience with 2-3 years direct VM experience. RSCS, PROFS and VTAM experience highly desirable.

We offer professional challenge and growth, a competitive compensation package, as well as outstanding benefits and relocation assistance. Please send resume and salary requirements in confidence to:

Schreiber Foods, Inc.

Corporate Employment
P.O. Box 19010
Green Bay, WI 54307-9010

An Equal Opportunity
Employer M/F/H/V

EMPLOYMENT SERVICE FOR PROGRAMMERS AND ANALYSTS

National Openings With Client Companies and Through Affiliated Agencies

Scientific and commercial applications • Software development and systems programming • Telecommunications • Control systems • Computer engineering • Computer marketing and support.

Call or send resume or rough notes of objectives, salary, location restrictions, education and experience (including computers, models, operating systems and languages) to either one of our locations. Our client companies pay all of our fees. We guide you decide.

RSVP SERVICES, Dept. C
Suite 700, One Cherry Hill Mall
Cherry Hill, New Jersey 08002
(609) 667-4488

RSVP SERVICES, Dept. C
Suite 201, Dublin Hall
1777 Walton Rd. Blue Bell, PA 19422
(215) 629-0595

From outside New Jersey, call toll-free 800-222-0153

RSVP SERVICES

Employment Agents for Computer Professionals

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

A Tradition Of

INNOVATION

At Compugraphic, our tradition of innovation has made us a world leader in the competitive graphics communication industry. We're looking for people to build on that tradition by accepting the challenge we've undertaken... to continue finding new ways to develop the finest, most cost-effective graphic arts and text management systems and products available in the world. Join us. And become part of our tradition.

Compugraphic is located off Route 128, "America's High Technology Highway," just 20 minutes from all the educational and cultural resources of Boston and close enough to the many recreational opportunities of New England's beautiful mountains and beaches.

PRODUCT DEVELOPMENT Principal Software Engineers

Use your consulting, advisory and architectural aptitude to establish yourself as an expert!

- Develop on PC's running UNIX™
- Graphics applications
- Database design
- Text processing/Editing
- Publishing problems

These positions require people with the ability to help others discover solutions which fit the challenge. You should have 7 or more years of experience and evidence of expert knowledge.

Software Project Leaders

We have several opportunities to solve technical problems with innovative but practical design approaches. There are several areas open now. Why not show what you can do?

- Manage small groups
- Contribute technically
- Create functional specs and designs
- Develop project plans
- Select from graphics, systems (drivers), editing, interactive, real time or database challenges.

We look for a person who has a Bachelor's degree plus 5 or more years of meaningful software experience.

For the preceding 2 positions, please send your resume to Dave Stevenson.

TECHNOLOGY LABORATORY GROUP Diagnostic Engineers

You can have it all! Satisfy your desire for diversity while becoming a key contributor on this crucial team.

- Immediate involvement in PC based platform projects
- Design, code, debug and document software
- Assembly and other high level languages which will interface to PC DOS
- Integrate software modules into an overall diagnostic project
- BSEE/BSCE, 3-5 years' experience in diagnostics or hardware design or coding of hardware drivers helpful

GRAPHIC ARTS GROUP Senior Engineers

This group offers the opportunity to be associated with some of the sharpest minds around. You owe it to yourself to explore this.

- VAX/UNIX development environment
- "C" language
- Microsoftware design
- Software design and implementation for high quality text/graphics image setters and printers
- Must have 2-4 years' software engineering experience

For the preceding 2 positions, please send your resume to Mike Walsh.

Compugraphic Corporation offers excellent starting salaries, a full range of company benefits, promotions from within, profit sharing and pension plan.

Please send your resume to the appropriate person indicated above. Compugraphic Corporation, 200 Ballardvale Street, Wilmington, MA 01887. An Equal Opportunity Employer, M/F.

UNIX™ is a registered trademark of AT&T Bell Laboratories.

 **compugraphic**
Compugraphic Corporation
Creating the Future of Graphic Communications

4GL EXPERTS PROGRAMMER ANALYSTS SENIOR PROGRAMMER ANALYSTS SYSTEM ANALYSTS

Realize your potential and ability in our relaxed but dynamic environment, where creative self-starters are recognized, encouraged, and rewarded. We are experiencing explosive growth and can offer challenging and exciting opportunities for the top 4GL talent in the country.

Fourth Generation Technology (4GT) is a small company that enjoys a world-wide reputation as the leader in designing and developing very large 4GL-based systems. We sponsor in-house R & D projects, employ state-of-the-art support tools, and develop systems on PC work-stations and our IBM 4300 mainframe.

REQUIREMENTS:

- 5 years' experience developing business DP systems
- FOCUS, NOMAD, or RAMIS experience a definite advantage
- Verifiable record of sustained performance
- Ability to work in a team environment

We offer an excellent salary and benefit package. Interested candidates send your resume to: Susie Randle, Fourth Generation Technology, Inc. 1660 Hotel Circle North, Suite 600, Dept 304, San Diego, CA 92108.

Relocating to Torrey Pines 18 April, 1986
An Equal Opportunity Employer


FOURTH GENERATION TECHNOLOGY, INC.

Arizona/California/Texas/Colorado/Florida/Boston SCIENTIFIC OR BUSINESS PROGRAMMERS

All fees and relocation paid. \$25-45,000
If you have a BSEE, BSCE, BS in Mathematics or Physics or equivalent, we need you right now.

For Business: OS/VS/IMS/CICS/MVS/JES Prog/Anal/Systems/Data Base. All large scale installations.

For Scientific: experience in the computer, communications, semiconductor, or aerospace/defense industries.

Your name, resume, and present employer will not be given out without your permission.

For sincere personal service, please send a confidential resume to:

Dan Pullman (602) 274-5660

PULLMAN PERSONNEL

3033 North Central Ave., Suite 505, Phoenix, Arizona 85012

Let Dunhill Put You In Your Place

We've been putting professionals in their places for more than 21 years—places of opportunity.

Trying to find your place in MVS, CICS, IMS and Communications Systems Programming? How about IMS, CICS, IDMS, and ADABAS Programming Analysis? We also have requirements for DEC, VAX specialists, and other DP opportunities. Your background in banking, financial, manufacturing experience preferred.

Let Dunhill of Charlotte, the Professional Placement Service, put you in your place... a place of opportunity! Please call or write Keith Reichle, CPC, Data Processing Specialist, DUNHILL OF CHARLOTTE, INC., 6401 Carmel Road, Suite 107, Charlotte, NC 28226. (800) 438-2012 or (NC Call) (704) 542-0312.

Dunhill.

The International Personnel System

ADACOM GENERAL MANAGER

Fast growing data communications firm located in Overland Park, Kansas seeks a General Manager who has had P&L responsibility. This dynamic, results oriented individual must be familiar with IBM 3270 and have a successful track record in this industry. Attractive benefit package includes equity position for the right candidate. Send resume and salary requirements to:

PRESIDENT
ADACOM CORPORATION
PO BOX 14745
OVERLAND PARK,
KANSAS 66214

IMS & IDMS Specialists

Your Future

If you are experienced (two years or more on large scale systems), assertive, upwardly mobile computer professional, you can benefit by talking to Computer Task Group (CTG). CTG offers you the opportunity to enhance your career in a variety of specialty areas.

The Area

Harrisburg, capital city of Pennsylvania, is known for its four distinct, yet mild seasons. The area's economic growth is bucking the trend of other Northeastern areas. We are located in close proximity to mountains, seashore, and major metropolitan areas like Philadelphia, Washington, DC, Baltimore and New York City. You'll find that in every aspect of life here, there is an emphasis on quality.


The Company

Through a network of forty-five branch offices in major cities across the country, CTG develops information systems for Fortune 500 companies.

CTG offers competitive salaries, comprehensive benefits program, extensive educational opportunities - including Technical & Management training at our own Institute - and a stock plan.

The greatest benefit CTG offers you is our commitment to help our people reach their full potential. Come and grow with us!

Send your resume to:
Computer Task Group, Inc.
Rosemary Helm, 214 Senate Avenue,
Harrisburg, PA 17011, or call collect at
(717) 763-1699

 **COMPUTER TASK GROUP INC.**

CTG is an equal opportunity employer.

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

THE CRAY STYLE A STRONG SENSE OF QUALITY

Cray Research, Inc., the world leader in the design and manufacture of supercomputers, has immediate opportunities for highly motivated professionals throughout the Midwest and the Southwest. Strong customer relations skills are critical for these positions as are good oral and written communication skills.

PRESALES ANALYSTS

Responsible to technically support marketing representatives, make customer presentations, do benchmarking and write proposals. Requires excellent technical knowledge of large scale scientific modeling using FORTRAN. The ability to coordinate and schedule a variety of simultaneous tasks to complete projects. A BS or MS in mathematics, computer science or engineering and 5-7 years industry experience. Self motivated, mature individual.

SYSTEMS ANALYSTS

Responsible for installation, maintenance of Cray Operating System and customer technical support. Requires 3-5 years industry experience in FORTRAN, assembly language and operating systems internals. Experience in a large mainframe environment preferred.

ON-SITE ANALYSTS

Responsible for installation and maintenance of Cray software products on customer provided operating systems. Products include compilers, assemblers, libraries, and other utility. Requires 3-5 years industry experience in "C", PASCAL and FORTRAN. Prefer a BS in computer science.

Cray Research offers an excellent compensation package including profit sharing and salaries commensurate with experience. For confidential consideration, submit a resume outlining your qualifications and salary history to:

Mark Skidmore
CRAY RESEARCH, INC.
Human Resources
Dept. L
5350 Manhattan Circle
Boulder, CO 80303

Equal Opportunity Employer M/F/H/V



IDMS SUNSHINE



**** IDMS DATABASE OPPORTUNITIES AVAILABLE ****
CALIFORNIA AND FLORIDA !!

POSITIONS EXIST AT ALL LEVELS
COMPENSATION TO \$75,000

- * DIRECTOR OF CORPORATE DATA-BASE SYSTEMS
- * DATABASE ADMINISTRATORS
- * PROGRAMMER/ANALYSTS
- * CONTRACT CONSULTANTS

CALL TODAY, OR SEND YOUR RESUME IN CONFIDENCE:

EXECUTIVE DIRECTIONS, INC.
6067 HOLLYWOOD BLVD.
SUITE 302
HOLLYWOOD, FL 33024
(305) 962-9444

ACP/TPF

HOME PURCHASE AVAILABLE!!!

Our client needs 7 top ACP/TPF professionals for the most exciting TPF project in the industry. Top salaries, stimulating environment and a relocation package which includes purchase of your home. Experience levels from 3 to 10+ years, both applications and systems background needed. THESE OPENINGS ARE EXCLUSIVE WITH OUR FIRM.

We also have nearly 200 other ACP/TPF openings across the country, many with similar relocation packages, and can arrange for local interviews in your area.

For a confidential consultation, phone collect till 9 p.m. CST or forward your resume to:

ACP, INC.
P.O. Box 50084
Denton, TX 76202
817/565-0658

Please - ONLY experience with the TPF/ACP (Airline Control Program) system can be considered.

INFO. CENTER MGR.

Lge. WESTERN NY fin'l. enterprise actively seeks high profile Info. Center Mgr. to plan & direct expanding I.C. service. Pref. M.S. degree + bkgd. in mgmt. incl. PC's & mainframe. Highly visible, influential opp'ty. To \$50,000.

ROBERT HALL
OF BUFFALO, INC.
420 Main Street
1310 Liberty Building
Buffalo, NY 14202
(716) 842-0801
Personnel Agency

Systems Programming Supervisor

Our Affiliated Banc Group data center is experiencing rapid growth and expansion. We now have a challenging position for a qualified candidate. We are seeking a supervisor for our systems and programming department experienced in NCR's NEAT/3 language or Assembler equivalent. This person should have some supervisory and a technical background in financial applications such as CIS, General Ledger, Item Processing, POD, on-line for data communications etc. In addition Cobol would be desirable and general banking knowledge would be a plus. Attractive benefits and salary programs are offered. Please send resume with salary requirements to:

Ruth Christensen
Affiliated Banc Group
North Shore National Bank
1737 Howard Street
Chicago, Illinois 60626

DATA PROCESSING SYSTEMS PROGRAMMER II

Central Washington University is currently establishing a list of experienced Systems Programmers to provide software operating systems support and development for its clustered VAX VMS environment. Persons in this class work independently at the highest technical level to support systems software upgrades, systems utilities, cluster upgrades, and systems management.

Minimum Qualifications: One year of experience as a Systems Programmer I, or equivalent; OR a Masters Degree in Computer Science. DEC VAX clustered systems management experience is preferred.

Salary range is \$2,117 - \$2,710 per month. Applications will be accepted until May 19, 1986. Contact Personnel and Benefits, Central Washington University, Ellensburg, WA 98926 or call 509 963-1202.

EEO/AA/Title IX Institution

Mississippi State University is seeking an experienced data processing professional to fill the position of Systems Analyst and Project Leader within Administrative Data Processing. The successful candidate will also be responsible for data base administration.

Requires B.S. degree in Computer Science or related area and seven years of practical work experience in programming and systems analysis or any equivalent combination of education and work experience. At least two years of work experience must include data base design and implementation using DMS 1100, TIP and DPS on Sperry 1100 mainframes. Experience in a University environment dealing student and financial information systems is highly desirable.

To be considered, submit resume to:

Danny M. Kemp
Manager of Administrative Services
Mississippi State University
P.O. Drawer CC
Miss. State, MS 39762
MSU is an affirmative action/ equal opportunity employer.

Why Gamble On A Career Move?

"Why roll the dice with an unproven firm, you have the number of the most exclusive real-estate search firm serving Commercial Banking."

----- Current Openings -----
Loans, DCA, Bankcard, On-line Teller, Check Processing, Home Banking, Leasing, Wire Transfer, C/F, ATM, Platform Automation, Programmer, Senior Programmers, Project Leaders, Project Mgrs., Systems Analysts, Senior Systems Analysts, DBA's, AVP Level, VP Level.

Andy W. Park, Vice President

919 493-5444

Banking & Real Estate Search Division
Bender and Associates, Inc.
200 Eastmore Drive, Suite 209
Chapel Hill, NC 27514
fees assumed by client companies

MAINE - N.H.

We have specialized in data processing professional placement in Maine & N.H. for a fifth of a century. If you qualify for positions in the \$25-50,000 range, please contact us in total confidence. Our clients pay our fees and provide relocation assistance.

ROMAC.

183 Middle St., 2nd Floor
P.O. Box 7040 OTS
Portland, Maine 04112
(207) 773-4748

MAJOR EXPANSIONS —Southeast—

Unprecedented growth of prestigious Carolina company has created numerous opportunities in their State-of-the-Art data center IBM 3090 and 3084; MVS/AA, IMS, NCP/VTAM, CICS Currently seeking Programmer/Analysts, Systems Analysts, DBA's and Systems Programmers. Banking or Insurance exp. guarantees immediate consideration. Opportunity for rapid advancement into Sr. level & Project Mgmt. Salaries to \$40K + CASH BONUS. For more info call Camille Hankins collect at (704) 375-0000 or send resume to:

212 S. Tryon Street, Suite 1350
Charlotte, NC 28281

Billion \$ corporation seeks several Programmer Analysts & Systems Programmers with 2-5 yrs. exp. for this ground-floor opportunity. (DBS/IMS Prog. Anal. (Mtg./Financial) Open NCP/VTAM Sys. Prog. (New Start-Up) ... To \$30K CICS Prog. Anal. (Coding/Anal.) ... To \$38K MVS/AA Sys. Prog. (Plans/Mainfr.) ... To \$45K Top Person including stock options, savings plan, and relocation bonuses. If you are serious about a career move call Robert Montgomery collect at (919) 872-2940. Over 6 yrs. experience specializing in data processing.

P.O. Box 40129
Raleigh, NC 27629

FOX-morris

**IN SAN FRANCISCO IT'S
SPRING YEAR 'ROUND!**
DATA PROCESSING PROFESSIONALS
skilled in Main Frames, Minis or Micros
- DATA-BASE or ON-LINE SYSTEMS -
Consider a move to the beautiful
SAN FRANCISCO BAY AREA.
Career opportunities offering
CHALLENGE, GROWTH and REWARDS.
LOGICAL OPTIONS
Est. 1975
One Market Plaza, Suite 200, Suite #2014A
San Francisco, CA 94105 • (415) 777-3000

PROGRAMMER-COMMUNICATIONS
- Involved in programming real time micro-processor-based software for a satellite earth station project; coding & testing software for a packet switching system. Util. knowl. of Digital Electronics, "C" language, Assembler, X.25 Protocol for Communications Switches & HDLC Communications Concept. Req. Bach. in Comp. Sci. \$27,500/yr. Send Resume to NYS Job Service, State Office Bldg., Veterans Memorial Hwy., Hauppauge, NY 11788 JO #0605697. DOT 120187010.

CLASSIFIED ADVERTISING ORDER FORM

Issue Date: Ad closing is every Friday, 10 days prior to issue date.

Sections: Please be sure to specify the section you want: Time and Services, Software for Sale, Position Announcements and Buy/Sell/Swap. (Available upon request: Software Wanted, Real Estate, and others).

Copy: We'll typeset your ad at no extra charge. Please attach CLEAN typewritten copy. Figure about 25 words to a column inch, not including headlines. Any special artwork should be enclosed with your ad also. Logos must be submitted on white bond paper for best reproduction.

Cost: Our rates are \$161.70 per column inch. (Each column is 1 13/16") Minimum size is two column inches (1 13/16" wide by 2" deep) and costs \$323.40 per insertion. Extra space is available/billed in half-inch increments and costs \$80.85. Box numbers are \$15.00 extra per insertion.

Billing: If you're a first-time advertiser, (or if you have not established an account with us.) WE MUST HAVE YOUR PAYMENT IN ADVANCE, or a Purchase Order Number. Any extensions on this policy must be made through our Credit Department.

Ad size desired: _____

_____ columns wide by _____ inches

Issue Date(s): _____

Section: _____

Name: _____

Company: _____

Title: _____

Address: _____

Telephone: _____

Send this form to:

COMPUTERWORLD
CLASSIFIED ADVERTISING
375 Cochituate Road
Box 9171
Framingham, MA 01701-9171

Telecopier service is available.

Call: 800-343-6474 or 617-879-0700

extension 410 or 451

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

NJIT

PROFESSIONAL POSITIONS

New Jersey Institute of Technology invites applications for the following positions:

Supercomputer Node Telecommunications Specialist Assist members of the JVNC node, including NJIT, the University of Medicine and Dentistry of New Jersey (UMDNJ), and Stevens Institute of Technology. Applicants should be familiar with telecommunications protocols, including Decnet and TCP/IP, DEC VAX/VMS (with some internals), LAN's telecommunications equipment diagnosis and repair, and possess a degree in Electrical Engineering, Computer Science, or related field. Reports to the Director of Technical Operations. Send resume: Personnel Box STS.

Supercomputer Applications Specialist Assist instructional and research users in developing and converting computer programs to run optimally on the CDC Cyber 205 utilizing parallel processing techniques. Working in cooperation with similar specialists at Stevens Institute of Technology and the University of Medicine and Dentistry, the Specialist would prepare and present seminars on vector processing, Cyber 205 FORTRAN, remote access techniques, and other research topics. The applicant should possess significant background in parallel processing, supercomputer applications, and research topics, with appropriate academic credentials. Reports to the Director of Academic Computing. Send resume: Personnel Box SAS.

Academic Computing Consultant Assist instructional and research faculty and supervise support activities for graduate and undergraduate student computer users. The ideal applicant will be familiar with VAX/VMS, UNIX, Plato, NOS, and IBM PC configurations and software. Programming experience should include Pascal, FORTRAN, and COBOL. Experience in graphics, CAD, and robotics would be a plus. Appropriate academic credentials required. Send resume: Personnel Box ACC.

Academic Specialist Assist graduate and undergraduate student computer users. Ideal applicant will be familiar with VAX/VMS, UNIX, Plato, NOS, and IBM PC configurations and software. Programming experience should include Pascal, FORTRAN, and COBOL. Appropriate academic credentials required. Send resume: Personnel Box AS.

NJIT is the public technological university of New Jersey with 7500 students enrolled in baccalaureate through doctoral programs within three colleges: Newark College of Engineering, the School of Architecture, and Third College, the college of sciences, humanities and management. The university supports instructional and research computational activities utilizing eight DEC VAXs, a CDC Cyber 830 with plato and design workstations, various advanced CAD and robotic systems, and, by the summer of 1986, will have deployed 5,000 IBM PC-compatible microcomputers on a campus-wide network. NJIT has also been designated as the Northern New Jersey node for access to the John Von Neumann supercomputing facility near Princeton. Affirmative Action/Equal Opportunity Employer.

Send resume: **Personnel Box (as appropriate)**
NEW JERSEY INSTITUTE OF TECHNOLOGY
Newark, NJ 07102



ADVANCE TO THE STATE OF BANKING TECHNOLOGY.

Advance to First Wisconsin National Bank - the largest bank in the state of Wisconsin. Our Information Services Division is rapidly becoming the most technically advanced data processing environment in the industry, using the latest tools and techniques available. **We have a commitment to new development** - our unique requirements make it necessary to develop our systems internally. **We have a commitment to quality** - we give our people the time and money required to produce quality products. **We have a commitment to the professional development of our people** - their technical and personal growth is essential to achieving our business goals. If you share our commitment, if you set excellence as your personal standard - then you're the person we want.

We currently have openings for the following with IBM experience:

SYSTEMS ANALYSTS
PROGRAMMER ANALYSTS
IMS DB/DC SYSTEMS PROGRAMMER
IMS DB/DC DATA ANALYST

We provide excellent starting salaries, a comprehensive benefits package and outstanding opportunities for advancement. To join our growing team of professionals, submit your resume to:

Judith A. Pennington, Assistant Vice President

FIRST WISCONSIN NATIONAL BANK

777 E. Wisconsin Avenue
Milwaukee, WI 53202

We are an equal opportunity employer.

MIS DIRECTOR

We are a small Midwestern manufacturer who is consolidating our information needs under our first professional MIS Director.

We desire someone with a Bachelor's Degree in Computer Science coupled with 5 or more years of systems design with heavy emphasis on manufacturing. Real-Time experience and PC knowledge is also required.

In return we will offer a stable and professional environment, excellent facilities, and promotional opportunity into other functional areas. Compensation to the 40's plus bonus. You can reply in complete confidence.

Reply to CW-B4776
Computerworld
Box 9171
Framingham, MA 01701-9171

Downtime at Union Mutual

IDMS DATABASE ANALYSTS

at Union Mutual find their downtime as rewarding as being on-line with our leading-edge technology.

Because Union Mutual and Maine offer the perfect mix:

Systems excellence

Union Mutual, a Fortune 50 life insurance company, is one of the largest and fastest growing insurance organizations in the country. We'll challenge you and reward you with development projects on pace-keeping hardware, growth and advancement opportunity, and a role in strengthening our reputation as an industry leader.

Maine's debugging

The bug is Maine's wilderness image. Dump it. Greater Portland offers an uncompromisingly uptown lifestyle. Symphony, opera, theatre, our colleges and universities, and our professional hockey and baseball teams are only a part of the story.

The Vacationland State

You've probably heard of Maine's natural beauty: the mountains in autumn, summer on our rocky coastline or white sand beaches. We can be sailing or skiing, fishing or canoeing within minutes of our homes or our offices.

If you're one of the best

Union Mutual needs to add a top IDMS Database Analyst immediately. Two years of Cullinet IDMS or Honeywell IDS database experience is required, along with the motivation to challenge yourself and others with advancing technology.

To learn more about IDMS Database Analyst positions at Union Mutual and the joys of living in Maine, send your resume to Timothy Billingsley, Technical Recruiter, Union Mutual, Dept. CW42186, 2211 Congress Street, Portland, Maine 04122.



Union Mutual

The **UNION** commitment to excellence™

Union Mutual Life Insurance Company, Portland, Maine 04122.
An Equal Opportunity Employer

SOUTHEAST OPPORTUNITIES

HP 3000
● Prog/Anal: COBOL, Mfg. To \$31K
● Prog/Anal: FORTRAN, Mfg. To \$25K
● Prog/Anal: COBOL, QJEY To \$25K

SYSTEM 38
● Tech Supp: MAPICS, RPG II, Mfg. To \$34K
● Prog/Anal: RPG II Open

SYSTEM 36
● Prog/Anal: MAPICS To \$30K
● Prog/Anal: RPG II To \$30K

IBM 3083/3081
● Sys. Prog: AC/VTAM To \$44K
● Performance/Capacity Planning To \$44K
● Sys. Prog: OS/MVS To \$42K
● Data Base Analyst: IMS To \$36K
● Sr. Prog/Anal: IMS or CICS To \$35K
● Sr. Prog/Anal: IDMS To \$35K
● Prog/Anal: Banking or Insurance To \$32K

BURROUGHS MAINFRAMES
● Sr. Prog/Anal: Mfg. COBOL, GEMCOS To \$31K
● Prog/Anal: COBOL, Mfg. GEMCOS To \$29K

Partial listing, all fees, relocation and interviewing expenses assumed by our clients. Candidates w/2 yrs. exp. please apply. Send resume to P.O. Box 2681, Durham, NC 27703-0881.

VIP PERSONNEL SERVICES

NEW ENGLAND

MGR TECH SUPPORT\$55,000
FINL SERV CONSULTANT\$50,000
CICS-MACRO/COMB\$45,000
DMS/IMS\$45,000
MVS SYS PGMS\$44,000
PORTFOLIO SYSTEMS\$40,000
BANKING SYSTEMS\$38,000
RETAIL SYSTEMS\$36,000
PAYROLL APPL\$35,000
MAINE, IN, VT, RI\$33,000
CONSULTANT PGMS\$32,000
NOMAD/RAMS/FOCUS\$30,000
COBOL/PL-1/MARK IV\$30,000

BATTISTA ASSOCIATES

Personnel Consultants
303 Congress St., Suite 600
Boston, MA 02210
(617) 948-7874

"We have it in our power to begin the world over again"

— Thomas Paine
American Political Philosopher and Author

You have it in your power to change your world - your career and your lifestyle by contacting TRW's Operations and Support Group in Southern California.

Forget the swaying palm trees, beautiful beaches and snow capped mountains. Although much of it's true, let's forget all the hype about Southern California. Let's talk about your career and opportunities at TRW.

You can be part of a team that is designing and developing the systems of the future if you're an IDMS professional with a Bachelor's degree and at least 2 years experience. Tomorrow is taking shape at a company called TRW.

- IDMS ADS/O Programmer Analysts
- IDMS Data Base Administrator
- IDMS Software System Test Planner
- IDMS Senior Systems Analysts
- IDMS C-SPEC Project Leader

TRW offers excellent salaries and benefits including medical/dental/vision care coverage, liberal stock savings program, flexible hours, and a fabulous Southern California lifestyle. Please forward your resume with salary history to: TRW O&SG, R. Chambers, E1/4029, One Space Park, Redondo Beach, CA, Att: Dept. CW.

Equal Opportunity Employer
U.S. Citizenship Required

TRW

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

HOT WARM COOL

You'll find it all in New Orleans; Hot Cajun food, Warm people, and Cool jazz. But you'll find more than that, you'll find New Orleans is a great city to further your Data Processing career. New Orleans is the home of Middle South Services, Inc., the high-tech service arm of the Middle South Utility System. Middle South Services equals career opportunity for the data processing professional, New Orleans equals excitement.

Middle South Services' technical environment currently consists of IBM 3090's, 3083, 4381; MVS/XA, VM, IMS DB/DC and Tandem Non-Stop II's. Openings exist for the following:

ANALYST/PROGRAMMER (IBM)—Several openings are currently available for experienced Analyst/Programmers with at least two years of IBM mainframe experience. Knowledge of OS/VS and TSO/ISPF required. PL-1 COBOL, and/or IMS DB/DC experience helpful.

PROJECT LEADER—The position involves directing the installation and maintenance of Middle South Services "Transform TNS" applications generation at customer sites. Previous project management experience is required, preferably in a Software House environment. Knowledge of COBOL, PATHWAY, and Tandem systems will be extremely helpful.

SR. SYSTEMS ANALYST—The position involves the development of utility software, 4th GL, and DBMS in a Tandem Alliance Software House environment. Experience required includes knowledge of COBOL, TAL, and PATHWAY.

Middle South Services' relocation package includes a relocation allowance (one month's salary)...paid moving expenses...paid house hunting trip...mortgage interest differential...plus interim living. We offer excellent benefits and compensation packages. For more information contact Joseph Hotard or Byron Heath, Middle South Services, Inc., P.O. Box 61000, New Orleans, Louisiana 70161

1-800-231-4481

In Louisiana call collect: (504) 569-4960



MIDDLE SOUTH SERVICES INC.
An Equal Opportunity Employer M/F/H

PROGRAMMER

Mid level position with an internationally recognized health care and research corporation is available immediately. Position requires 2 plus years of structured COBOL experience, preferably in an interactive environment. General knowledge of systems design methodology necessary. Current environment is Data General MV16000SK. Salary for position is negotiable based upon knowledge and experience. Excellent benefit package. Send resume with salary history to:

The Personnel Department
Project HOPE
Carter Hall
Milwood, VA 22646
EOE

SUNNY SOUTH

DP Mgr S/38 RPG III	TO \$40K
Info Services Mgr	TO \$47K
DEC/VAX development	TO \$35K
S/P OS/MVS/XA/RCF2	TO \$45K
PA/RPG II & III	TO \$30K
Prod Mgr Banking	TO \$38K
DBA IMS DB/DC	TO \$43K
DBMS req ADSSO + +	TO \$38K
P/A any retral apps	TO \$35K
HF3000 COBOL	TO \$23K
S/38 COBOL & RPG III	TO \$31K
VAX/VMS Systems	TO \$40K

ROBERT WOLF
of New Orleans
P.O. Box 57828
New Orleans, LA 70157
(504) 835-4256

SOUTHEAST

Our 25th year of serving North Carolina and the Southeast in the Data Processing field. Client Fortune Companies need Programmer Analysts, Programmers, Technical Support, Consultants immediately. Let us confidentially and professionally help you meet these career goals. Any hardware/software ok. Fee paid. Write or call today.

DABBS & DABBS
PERSONNEL CONSULTANTS
Box 4138
Salem, NC 28144
(704) 536-0841

DATA MODELING

Holland Systems approach helpful. Data dictionary experience a must. East Coast location. Please send resume to:

Kerry Richman Search
8600 LaSalle Rd. Ste. 673
Towson, MD 21204
(301) 583-8100

COMPUTER PROGRAMMER

MS in Computer Science - for design/development of 2 and 3 dimensional graphic software from both technical and end-user input to produce adaptive user interfaces. Knowledge of advanced mathematics and G.K.S. standards essential. 5 days - 40 hour week, \$28K/year. Resumes only please.

Boris Stout
Cybervision, Inc.
1280 Main St.
Buffalo, NY 14209

"PICK" PROFESSIONALS

The City of Fort Myers is looking for individuals for the management of micro-data equipment. PICK operating experience required with 3 years of programming/analysis/management experience. 1 year of supervisory experience desirable for progressive advancement. Send resume and salary history to:

Director of Personnel
P.O. Drawer 2217
Fort Myers, FL 33902
EOE

Applications Programmer/Analyst-Level 2 - Analyze systems; assist in design, development and implementation of commercial and financial computer software applications. Use NCR 8585 or IBM 3033, COBOL, TOTAL, TRANPRO, OS/MVS. Bachelor's degree Computer Science or Operations Research. 2 years experience, 40 hour week, 9-5, \$33K per year. Mail resume: Orlando Job Service, JO #FL5206442, 3421 Lawton Rd., Orlando, FL 32803, DOT 012167066.

ANALYST PROGRAMMER III

Needed in marketing applications development. At least 4 years programming and design experience in a business application (preferably Marketing Systems) environment in a large data processing installation. BS degree in Business Administration or Computer Science desirable; college level MIS courses, seminars, workshops or equivalent work experience may also be substituted for the degree. Must be proficient in DIBOL and have working knowledge of various DEC operating systems; RSTS, RSX-11M+ and Sperry 1100 experience desirable, but not required.

FOSTER FARMS is a progressive growth oriented company engaged in breeding, producing and distributing natural chicken and turkey products located in California's Central San Joaquin Valley. Excellent benefits and salary commensurate with experience. Send resume and salary history to:



FOSTER FARMS
Attn: AF3-EG
P.O. Box 457
Livingston, CA 95334
Deadline: April 30, 1986
EOE

COMPUTERWORLD

COMPUTERWORLD's paid circulation climbed to over 129,522 this fall. Folio 400 (Folio Magazine's study of trade publication performance) placed us first in total revenue. As the industry grows, so will COMPUTERWORLD. It will continue to offer the high quality news coverage and editorial content that has attracted its readers. What does that mean to you, our advertisers? Good news...in the form of wide exposure.

The Classified section of the newspaper is laid out in an attractive format and is easy to read. It offers classifications to solve a variety of problems:

**Position Announcements, Buy • Sell • Swap,
Software For Sale, Software Wanted,
Time & Services, Bids & Proposals,
Business Opportunities, Real Estate,
Auctions, Positions Wanted, Seminars &
Conferences, Publications and The Bulletin Board**

Our BULLETIN BOARD section is ideal for the smaller companies who want a low-cost way to sell pieces of equipment (hardware or software). The BULLETIN BOARD is laid out as a quick reference for potential buyers who know what they are after.

So, as a nationwide publication, we give you the exposure you want. As a weekly publication, we give you the immediacy your advertisements need.

A number of Executive Reports and Product Spotlights are scheduled to run in COMPUTERWORLD during 1986. Each of these features will focus on one aspect of the computer industry and give our advertisers a chance to reach a more select audience. These are some of the topics the features will cover:

Executive Reports

- Apr 28 - Software Maintenance
- May 5 - Training End Users
- May 19 - Electronic & Voice Mail
- May 26 - In-house Publishing
- June 16 - The Bunch Companies
- June 30 - Integrated OA Systems
- July 21 - PBX Networks

Product Spotlights

- May 12 - Disaster Recovery
- June 2 - Word Processing Software
- June 23 - Personal Computer Graphics

COMPUTERWORLD publishes every Monday with an ad deadline of 10 days prior to each issue date. The issue of May 5th will be closing April 25th. You may send in copy to be pubset or camera-ready material (velox or negative) via the mail. We provide telecopier service and will also take ads over the phone.

Information concerning classified advertising rates, color costs, ad sizes, mechanical specifications along with more detailed information on the special issues is contained in the 1986 Rate Card #21 and Media Kit. Or from our offices.

Your mailing address is

COMPUTERWORLD
Classified Advertising
Box 9171, 375 Cochituate Road
Framingham, MA 01701-9171

Or call for more information at

1-800-343-6474 or, in Massachusetts, (617) 879-0700

Saudi Arabia

Exceptional opportunities are available at the King Faisal Specialist Hospital and Research Centre. The Hospital, located in Riyadh, Saudi Arabia, is a 500-bed acute care facility with an international staff.

Positions are available now or periodically for:

DATA BASE ANALYST: BS degree in Computer Science or equivalent. 5 years DP experience with 2 years in data base design, control and management. All applicants must be thoroughly familiar with IBM hardware, DL-1 database, CICS & COBOL, and DOS/VS. Hospital DP experience highly desirable.

SUPERVISOR, OFFICE EQUIPMENT: 5 or more years experience, 3 years in a supervisory capacity, in the repair of office equipment, specifically CPT machines.

Commitments are for 24 months. Salaries are attractive and the exceptional benefits include 30-day annual paid vacation, free transportation, furnished lodging, bonus pay and bonus leave. The selected candidates will be employed by and work directly for the Government of Saudi Arabia.

For further information and/or to apply, please call our toll-free number (800) 251-2561 or send your resume to: HCA International Company, Dept. CW-0421, P.O. Box 550, Nashville, TN 37202. HCA is an Equal Opportunity Employer.

**HCA
International
Company**

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

**DEC VAX/VMS**

We're CTG, the number one provider of quality software development services to Fortune 500 clientele.

We currently have positions for **PROGRAMMERS and ANALYSTS** with a minimum of one year of DEC VAX/VMS experience. Whether your area of expertise is in **COBOL, FORTRAN or DBMS**, we would like to talk with you about opportunities in **Commercial, Real Time and Industrial Automation Systems Development**.

We have positions available in several Southeast cities, including:

• CHARLOTTE, N.C. • GREENVILLE, S.C. • WINSTON-SALEM, N.C.

In order to attract and retain superior individuals, CTG provides an excellent salary and benefits package as well as challenging assignments and a unique opportunity for professional growth. For additional information, CALL or RUSH your resume to:

**COMPUTER TASK GROUP • 5600 77 Center Dr. • Suite 230
Charlotte, N.C., 28210 • (704) 527-6730**
Equal Opportunity Employer



Hughes

EDP Auditors

At Hughes Aircraft Company, we enjoy a position as the world leader in the electronics industry. You can become part of that when you join our Corporate Internal Audit Department. Due to growth in this department, we are currently seeking EDP Auditors to meet our needs.

You will be involved in activities such as conducting audits for data processing computer centers, development projects, technical areas, and application systems; consulting engagements; programming and technical support of non-DP internal and external audit staffs. This position requires travel to various plant sites in the Los Angeles and Orange County area. Travel outside of these areas will be minimal.

We are seeking experienced individuals with technical data processing knowledge and good general business acumen. You will also need good analytical

and communication skills as well as the ability to interface effectively at all organizational levels. CDP, CISA or audit experience will be a plus.

We offer an attractive salary and an outstanding benefits package, including tax-deferred savings; medical, dental and vision care coverage; plus paid time off between Christmas and New Years.

Please send your resume, including salary history, to: Hughes Aircraft Company, Corporate Employment, Dept. WC-4C, C1/D116, P.O. Box 45066, Los Angeles, CA 90045-0066.

Proof of U.S. citizenship required. Equal opportunity employer.

Creativity America depends on.

HUGHES
AIRCRAFT COMPANY

CORPORATE HEADQUARTERS

DATA PROCESSING CAREERS

IBP Inc., a subsidiary of Occidental Petroleum with over 17,000 employees, is the world's largest fresh beef processor and a growing force in the fresh pork industry with 1985 domestic and international sales of over \$6.5 billion.

Due to rapid growth, our MIS Division has been approved to add 12 new positions at our corporate headquarters at the levels of Programmer, Programmer Analyst, Systems Analyst and Project Manager. We seek on-line/real-time IBM mainframe experience utilizing COBOL, CICS, DL1, JCL, OS/MVS and SPF and the desire to work in the following environment:

- IBM mainframe state-of-the-art shop.
- 75% of job time spent on new development.
- Large shop with a flexible schedule.
- Excellent professional and personal career advancement potential.

If you seek a challenging career with the industry leader, and if you meet our specifications, send your resume to:

ibp.

Norman Higginbottom
Corporate Recruiter
IBP, Inc.
P.O. Box 8000
Stout City, IA 51102
(402) 241-2971

Equal Opportunity Employer M/F

Director of Information Technology University of Michigan College of Engineering

The University of Michigan's College of Engineering is seeking a person to serve as Director of Information Technology. This position will require demonstrated competence in creating and managing an advanced research and instructional distributed-computing facility. Proven ability to handle both administrative and technical direction for a multi-million dollar, multi-vendor computing environment is necessary.

Experience in building a major facility, including hardware acquisition, design of physical facilities, and professional staffing is desired. Capability to provide management expertise while also maintaining advanced and current technical knowledge in the field is required. A solid background in relevant computer research areas, the ability to interface with advanced users from a wide variety of disciplines, and to provide the types of service required by such users, is necessary. Demonstrated ability to maintain a faculty in a leadership position at the forefront of computer science and engineering is required.

Please send resume to:
D.E. Atkins
Associate Dean for Research
and Graduate Studies
285 Chrysler Center Building
University of Michigan
Ann Arbor, Mich. 48109

The University of Michigan is a non-discriminatory, affirmative action employer.

SYSTEMS ANALYST

\$25,957 - \$32,446
(Normal Hiring Range)

Located 30 miles north of Seattle, Washington, we are the nation's 12th largest public electric utility, with 166,000 customers.

Expansion of our System Development Department has created an opportunity for an experienced Systems Analyst. Position is responsible for analysis and design of scientific systems, analyzing results of systems testing and performing cost benefit analysis studies. Assignments will be in Engineering and Technical Staff areas.

Requires ATA degree in Computer Science (BSCE preferred), and 10 years of progressively more responsible systems analysis experience in a data base environment. Must have a thorough knowledge of systems analysis, systems design, cost benefit analysis and advanced project management techniques as applied to scientific and engineering programs. Three (3) years of scientific programming; experience in an IDMS environment and electric utility engineering environment are highly desirable. Should have strong communication and personal interaction skills.

If qualified, send resume and cover letter to Sue Hofius, Personnel Department, Snohomish County PUD, P.O. Box 1107, Everett, WA 98206.

SNOHOMISH COUNTY PUD

Equal Opportunity Employer

PROJECT MANAGER-CONSULTANT

The Associated Students of UC Berkeley seeks an experienced Information Systems Manager to select and implement a minicomputer based accounting/budgeting system. Primary emphasis will be on a Point of Sale/Inventory System for the \$17 M gross sales per year Retail Store which will interface to the financial system. A 12-18 month negotiable personal services contract is offered. Experience with networking PCs and Micro Computers helpful. The ASUC is a non-profit campus auxiliary providing student government, student services and programs and Retail Bookstore.

For consideration, submit resume and salary requirements with a listing of projects implemented and 3 references to:

**PERSONNEL DIRECTOR
ASUC Personnel
400 Eshleman Hall
Berkeley, CA 94720**

Affirmative Action/
Equal Opportunity Employer

Information Industry Experts

GARTNER GROUP, INC. is a diversified, highly respected information industry research firm which provides sophisticated analysis of computer, office automation equipment and telecommunications companies to DP users and Fortune 500 technology suppliers. Our extraordinary success in the marketplace and rapid growth has created a substantial number of opportunities for a select group of experts within the following areas:

Director-Level Vacancies

Large Computer MainFrame

Knowledge of hardware architecture. Emphasis on large system 370, MVS or VM planning. Knowledge of the leasing business a plus.

Industry Service

Know large computer mainframe vendor products well. Know end-user requirements. Broad overview of the telecom, office and entire info industry and Japanese mkt.

Software Management Strategies Service

Know system 370 operating system software—MVS, VM, database management, IMS, IDMS, expertise in one or more of these areas.

Network Management

"Old fashioned" communication software, network connectivity issues, DIA/DCA, LU 6.2, SNA. Expertise in one or more of these areas (\$60k+)

Artificial Intelligence

Sense of what is req. to make AI tools and techniques a commercial reality in the mainstream of Information Services.

Manufacturing Automation / Mid-Range Computers

Factory automation background. Knowledge of NC machines, automated production line control, shop floor control, CAD/CAM, CAE, CIM, Robotics, expertise with a strategic understanding of the implications.

Telecommunications Service

Networking, voice / data wide area communications. Knowledge of private and public networks, packet and circuit switched networks & state-of-the-art transmission facilities.

Candidates should possess all of the following qualities including vendor background preferred with noted strength in at least one:

- Technical leadership in one of the above areas of specialty with polished, executive level communications skills; you command respect from clients and colleagues, and are a GURU or capable of achieving that status.
- Research and planning skills; you understand the structure, dynamics and companies in your area of specialization.
- Business know-how; you are an entrepreneur, implementor, and a self-starter who can lead both the research effort and client fulfillment.

Account Executives / DP Sales / Product Marketing

Qualifications includes a minimum of 2 years of successful sales / marketing experience with data processing products. Approximately 50% travel required for a sales position.

If you meet our qualifications, your experience and proven ability will be reflected in a motivating compensation package, as well as high visibility within our prestigious organization. Please reply in absolute confidence with current salary and indicating position of interest to:

Manager of Staffing & Development

GARTNER GROUP, INC.

78 Cummings Point Road
Stamford, CT 06904

Equal Opportunity Employer M/F



STUDENT INFORMATION SYSTEMS LEAD ANALYST POSITIONS OFFERED AT WEST VIRGINIA UNIVERSITY

STUDENT INFORMATION SYSTEMS POSITIONS

WVU Computing Services invites applications for the position of MANAGER, STUDENT INFORMATION SYSTEMS DEVELOPMENT. Reporting jointly to WVU Computing Services and the Office of Admissions and Records, this position is responsible for designing and developing comprehensive on-line student record systems. Selected candidates will be a proven technical manager experienced in system development, records administration, data bases, and on-line systems in an IBM environment. ADABAS and NATURAL experience are preferred.

The WVU Office of Admissions and Records offers a similar position requiring more operational experience and less emphasis on data processing. More information is available by calling the phone number given below.

WVU COMPUTING SERVICES PROFESSIONAL POSITION

LEAD SYSTEMS ANALYST: This WVU Computing Services position is responsible for leading project teams in long-term administrative system analysis, evaluating and recommending products, and senior level administrative consulting. Candidate selected will preferably have at least five years programming and analysis experience, with emphasis on the latter, plus a thorough knowledge of CICS, ADABAS, and IBM 3091 mainframes. Micro-computer experience will be helpful.

WVU OFFERS: Competitive salaries, excellent health, retirement and vacation plans; and outstanding education, cultural and athletic opportunities for you and your family at the state's comprehensive doctoral granting institution.

West Virginia offers a quiet and safe life style set in panoramic beauty. Located in Morgantown, WVU is close to six ski areas, year round recreation sites, national forests and wilderness preserves. Game and fish are plentiful in various places throughout the state. If you prefer urban areas, major East Coast and Southern cities are within easy reach by interstate highway or air.

Applications are available by phoning (304) 293-3405. West Virginia University is an AA/EEO Employer.

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

INTERNATIONAL D.P. ADVISERS SAUDI ARABIA DEPARTMENT OF COMMERCE BUREAU OF THE CENSUS

The U.S. Bureau of the Census has been providing data processing technical assistance in the developing world for more than 35 years. Currently there is a need on its overseas staff for:

SENIOR DATABASE ADMINISTRATORS

Selected applicants will be assigned to the CENSUS BUREAU's team working at the National Computer Center (NCC) in Riyadh, Saudi Arabia. The NCC is equipped with state-of-the-art equipment including an IBM 3081 system running CICS/TSO/MVS/SP and an increasing number of microcomputers. The database administrator is responsible for the design, development, programming and maintenance of various applications using Cullinet's Integrated Database Management System (IDMS).

Minimum qualifications include U.S. citizenship, at least 5 years experience in data processing, with at least a year as an IDMS database administrator on IBM equipment. A background in systems analysis, data security, data dictionaries, disaster recovery and system development methods is essential. Arabic language capability is desirable.

Assignments are for 24 months in Riyadh with the possibility of extension. Salary range is \$30-60K plus 20 percent differential, 5 percent Sunday premium pay, and a cost-of-living allowance. Other benefits include free furnished housing, automobile, use of PX and commissary, education allowances for children, medical insurance, storage costs and annual vacation, including round trip travel to New York.

These positions offer an excellent opportunity for travel, technical growth, and professional challenge.

Please send Standard Form 171, (Application for Federal Employment) to:

U.S. Department of Commerce
Bureau of the Census
Personnel Division, Room 3253
Washington, D.C. 20233
Attention: E. Archey
An Equal Opportunity Employer

PROJECT MANAGER/ SYSTEMS ANALYST

Bio-Rad Laboratories has been a recognized leader for 28 years in the fields of biotechnology and analytical chemical instrumentation. And, with a 20% plus annual growth rate over the past 17 years, excellent career positions continue to be created. We currently have a unique opportunity to get in on the ground floor of the Diagnostics Group's data processing efforts.

The Diagnostics Group which is approaching \$30 million in worldwide sales, has manufacturing sites in the Bay Area; Anaheim, CA; and Germany.

Duties include analyzing and evaluating our current system, assessing our needs, and designing new systems for manufacturing, sales/marketing, accounting, R&D, and freight handling. Hardware includes DEC Microvax, Sperry 1100, DEC and IBM personal computers. Emphasis will be on system design and implementation.

Requires a college degree in data processing, systems analysis, or operational analysis and five years of experience relating to systems design and implementation. Two years in a manufacturing environment is required, plus a basic knowledge of accounting and excellent communication skills.

Bio-Rad Laboratories offers a competitive benefits package. Please submit your resume to Bio-Rad Laboratories, Human Resources, Department #041-CW0421, 2200 Wright Ave., Richmond, CA 94804. An equal opportunity employer.

BIO-RAD

Bio-Rad Laboratories

DATA BASE ANALYST

The Pepsi Cola Bottling Company of Denver has an immediate opening for a Data Base Analyst/Programmer with a minimum of 3 years experience in the design and development of on-line data base systems. The applicant must have proven ability in Burroughs COBOL-74 and DBMS-II. Exposure to Burroughs Medium Systems and LINC is a definite plus. We are a progressive company seeking an individual to participate in the large scale development of manufacturing, distribution and financial accounting systems. We offer a competitive salary and excellent benefits. For consideration, send resume and salary history to: Pepsi Cola Bottling Company of Denver, 3801 Brighton Blvd., Denver, CO 80216, Attn: Donald Bloom, Systems and Programming Supervisor.

An Equal Opportunity Employer M/F/H/V

SOFTWARE INSTRUCTORS

- IMS DBA Specialist to train IMS Internals to DBAs
- VTAM Internals, NCP
- MVS Internals, debugging and tuning

75% travel; 16 weeks paid vacation; excellent benefits. Send resumes to:

Personnel Department
Verhoef
Information Packages
799 Bloomfield Avenue
Verona, NJ 07044

TEXAS

Our clients and affiliate offices in Texas specifically need experienced applic. & sys. P/A's. IBM DOS/OS/386, DEC/VAX, Dallas: S/38 Proj. Mgr. 60% tech. 40% mgmt. \$48-52k. Actual Proj. Ldr. \$38-41k.

2720 Stemmons Frey, 1207F
Dallas, TX 75207, (214) 837-6360

DATA PROCESSING CAREERS

SOFTWARE PROFESSIONALS

Seeking individuals with strong technical credentials, including the following:
• BS/MS/PhD in Comp. Sci. or E.E.
• UNIX/C (incl. Shell or Kernell)
• Switching systems, op. systems, compiler development, networking, AI
We are a dynamic firm that can offer you an opportunity to work with the best in the field. Send resume to:

The Prolec Group Inc.

2941 Kenny Rd., Suite 260
Columbus, OH 43221
(614) 457-9055

UNIX is a trademark of Bell Labs

SR. PROGRAMMER ANALYST - MSc. in Computer Science or Math with at least 8 years DP experience and 3 years UNIX. Must have worked with IBM mainframes and TSO/SP, JCL, VSAM and other IBM facilities. Duties include design development and implementation of IMS DB/DC batch and on-line systems and thorough knowledge of PL/I and COBOL. Write and implement report subsystems using MARK IV and other AGLS. Work independently, supervise jr. programmers and teach in above areas. Salary \$38,000 plus benefits. 40 hour week, Monday - Friday, 8:30 a.m. - 5:00 p.m. Send resume with salary history and references to Richard Over, CAP, Gamma America, 25 Commerce Dr., Cranford, NJ 07016.

PUBLICATIONS

PROG PA/PL/SA

\$55

Learn CICS

NEW! Practical CICS Made Easy

Pub by McGraw-Hill. Ideal reference/Intro. aids job interviews. How-to design systems and write complete structured Cobol program. Menu Intr. Chg Add Del debugging. Discover creative advanced bro-mse techniques using TS. Numerous sample examples. Once you have mastered the material in this book you will be prepared to develop and maintain most CICS programs. 278 pp., 105 illus. of must reading. Send \$29.95 plus \$3.00 S&H to:

On-Line Applications
P.O. Box 25, Dept. 15C
Nutley, New Jersey 07110-0028
(201) 444-7345

SEMINARS

EDP SECURITY SEMINARS

Five day seminars of lectures, discussions, study and testing. Successful participants will receive certification as EDP Security Administrators.

Seminar Topics include:

- Security Objectives and Vulnerabilities
- Risk Analysis
- Contingency Planning
- Security Audits and Investigations
- Disaster Recovery

Seminar Schedule:

- April 28-May 2 New York
- May 12-16 Denver
- May 19-23 Chicago
- June 2-6 Philadelphia
- June 9-13 Los Angeles

TESTING METHODOLOGY SEMINARS

Two day seminars designed to increase programmer productivity and efficiency. Promotes a cost effective system of producing reliable programs and systems.

Seminar Topics include:

- The Role of the Tester
- Important Testing Principles
- White Box vs. Black Box Testing Techniques
- Development of Test Plans
- Defining Test Completion Criteria

Seminar Schedule:

- May 6-7 Los Angeles
- May 13-14 Los Angeles
- May 20-21 San Diego
- May 28-29 San Francisco
- June 3-4 Denver

For immediate reservations or information, phone:

J.P. WESTON CORPORATION — 714/592-2939

or write to: 111 E. Arrow Hwy., San Dimas, CA 91773

Don't trust us to keep your Classified information secret

Every week, we deliver more of your target audience than anyone else. Over 600,000 computer-involved professionals. Including MIS/DP directors, systems analysts, programmers, and engineers — as well as corporate presidents, treasurers, and general managers.

And we deliver these readers for less. Compare costs and the people reached. You'll see that Computerworld is the number one medium for reaching MIS/DP professionals.

Our readers rely on Computerworld's classified section. In fact, 41% of our subscribers read the recruitment section every week. And 95% of our subscribers read this section regularly.

We make your ads work harder. Because we divide the classified section into logical categories: Position Announcements; Buy, Sell, Swap; Software For Sale; Time & Services; and The Bulletin Board. (Available on request: Software Wanted; Business Opportunities; and Real Estate).

So the people you want to reach will spend less time looking for your ad, and more time reading it.

We'll even typeset your ad at no extra charge. All you need to do is attach clean typewritten copy to your order. (Figure about 25 words per column inch, not including headlines). Or give us your order over the phone. We'll do the rest.

And since we're published weekly, we can offer you a fast turn-around from when you place your order to when your ad appears. As little as 10 days.

The next time you want results, advertise in Computerworld classified pages. Call toll-free at (800) 343-6474. In Massachusetts, call (617) 879-0700.

COMPUTERWORLD

Classified Advertising
Box 9171, 375 Cochituate Road
Framingham, MA 01701-9171

Computerworld Sales Offices

Publisher/Vice-President/Donald E. Fagan

VP/Sales/Edward P. Marzocchi
Manager/Marketing & Sales Operations/Kathy Doyle
COMPUTERWORLD, 375 Cochituate Road, Box 9171,
Framingham, MA 01701-9171
(617) 879-0700

BOSTON SALES OFFICE (617) 879-0700
Northern Regional Manager/Ronald Mastro
District Managers/Jim McClure, Michael F. Kelleher
David Peterson, Bill Coughlin
Account Manager/Sheel Driscoll
Sales Assistant/Alice Longley
COMPUTERWORLD, 375 Cochituate Road, Box 9171,
Framingham, MA 01701-9171

CHICAGO SALES OFFICE (312) 827-4433
Midwest Regional Manager/Russ Gerches
District Manager/Kevins McPherson
Sales Assistant/Jean F. Broadrick
COMPUTERWORLD, 2600 South River Road, Suite 304,
Des Plaines, IL 60018

NEW YORK SALES OFFICE (212) 967-1350
Eastern Regional Director/Michael J. Masters
Senior District Manager/Doug Cheney
District Managers/Joan Daly, Fred Lo Sappo, Frank Genovesi
Account Manager/Gale M. Palermo
Sales Assistants/Mary Burke, Sue Larson
COMPUTERWORLD, Paramus Plaza I,
140 Route 17 North, Paramus, NJ 07652

LOS ANGELES SALES OFFICE (714) 261-1230
District Managers/Bernie Hockswender, Carolyn Knox
Western Regional Director/William J. Healey
COMPUTERWORLD, 18004 Sky Park Circle, Suite 255,
Irvine, CA 92714

SAN FRANCISCO SALES OFFICE (415) 421-7330
Western Regional Director/William J. Healey
Senior District Manager/Barry Milnes
District Managers/Ernie Chamberlain, Mark V. Glatner,
Account Manager/Diane Fuller
Account Manager/Classified/Nicole Boothman
COMPUTERWORLD, 300 Broadway, Suite 20,
San Francisco, CA 94133

ATLANTA SALES OFFICE (404) 394-0758
District Manager/Jeffrey Melnick
Eastern Regional Director/Michael J. Masters
Sales Assistant/Michael Christie
COMPUTERWORLD, 1400 Lake Hearn Drive, Suite 330,
Atlanta, GA 30319

DALLAS SALES OFFICE (214) 991-8366
District Manager/Mark V. Glatner
Western Regional Director/William J. Healey
COMPUTERWORLD, 300 Broadway, Suite 20,
San Francisco, CA 94133

CLASSIFIED ADVERTISING (617) 879-0700
National Recruitment Sales Manager/Al DeMille
Recruitment Account Executives/Geoff Dodge,
Derek E. Hultsky
COMPUTERWORLD, 375 Cochituate Road, Box 9171,
Framingham, MA 01701-9171

CW INTERNATIONAL MARKETING SERVICES
Managing Director/Frank Oulitis
COMPUTERWORLD, 375 Cochituate Road, Box 9171,
Framingham, MA 01701-9171
(617) 879-0700

COMPUTERWORLD, 1050 Marsh Road
Menlo Park, CA 94025
(415) 328-8064

CW Communications/Inc.

Board Chairman
Patrick J. McGovernPresident
W. Walter BoydExecutive Vice-President
Lee Vidner

Publisher/Vice-President, Donald E. Fagan, Senior VP-Communication Services, Jack Edmonston.
VP-Sales, Edward P. Marzocchi, Group VP-Circulation, Margaret Phelan, VP-Research, William P. Murphy.
Computerworld Headquarters: 375 Cochituate Road, P.O. Box 9171, Framingham, MA 01701-9171
Phone: (617) 879-0700, Telex: 95-1153.

SALES VP President, Edward P. Marzocchi, Manager/Marketing & Sales Operations, Kathy Doyle, National Recruitment Sales Manager, Al DeMille, Display Advertising Manager, Anne Hadley, Senior Coordinator, Carolyn Medeiros, Display Advertising, Maureen Carter, George W. Griffin, Joy Forman, Classified Operations Manager, Cynthia Delany.
COMMUNICATION SERVICES Senior Vice-President, Jack Edmonston, Director Research, Kathryn Dineen, Sales Promotion Director, Liz Johnson

PRODUCTION Production Director, Peter Holm, Production Manager, Marlene Stibal, Paste-Up Manager, Patricia Gaudette, Typesetting Manager, Carol Potack, Art Director, Tom Monahan.

CIRCULATION Group Vice-President, Margaret Phelan, Circulation Director, Nancy L. Merritt, Corporate Fulfillment Director, Maureen Burke.

CONFERENCE MGT. GROUP President, William R. Letch.

MIS Corporate Director MS, Jeff Cordiero.

Computerworld can be purchased on 35 mm microform through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106.

Phone: (313) 761-4700. Computerworld is indexed: write to Circulation Dept. for subscription information.

Foreign Editorial/
Sales Offices

Argentina: Ruben Argento, Computerworld Argentina, Av. Belgrano 406-Piso 9, CP 1092 Buenos Aires. Phone: 34-5583/5584. Telex: 22644.

Asia: Euan Barty, Asia Computerworld Communications Ltd., 701-4 Kam Chung Bldg., 54 Jaffe Road, Wanchai, Hong Kong. Phone: (05) 8163238. Telex: 72827 (COMWR HX)

Australia: Alan Power, Computerworld Pty. Ltd., 37-43 Alexander Street, Crows Nest, NSW 2065. Phone: (02) 4395133. Telex: AA74752 COM-WOR.

Brazil: Eric Hipeau, Computerworld do Brazil, Rua Pedrosa de Moraes 1553, 05419 Sao Paulo, SP Brazil. Phone: 814-9658-212-8750. Telex: 11 32017 (WORD).

Denmark: Preben Engell, Computerworld/Danmark A/S, Torvegade 52, 1400 Copenhagen K, Denmark. Phone: (01) 955 695. Telex: 31566.

France: Axel LeBlais, Computerworld Communications S.A., 185 Avenue Charles De Gaulle, 92200 Neuilly Sur Seine, France. Phone: 747 1272. Telex: 613234 F.

Hungary: Dezzo Futasz, SZT Computerworld, P.O. Box 386, Budapest, 1536, Hungary.

Italy: Daniele Comboni, Computer Publishing Group S.R.L., Viale Restelli 5, 20124 Milano. Phone: (2) 688 9773. Telex: 333436 (GEJIT).

Japan: Mr. Shuji Mizuguchi, Computerworld Japan, 7-4 Shintomi 1-Chome, Chuo-ku, Tokyo 104. Phone: (03) 551-3882. Telex: 252-4217 (Computerworld Japan only).

Steven Yamada, Tokyo Representative Corp., Sanshin Kogyo Bldg., 2-10 Kando Jimbocho 3F, Chiyoda-ku, Tokyo 101, Japan. Phone: 230-4117. Telex: J26860 (reps for all CWCI publications except Computerworld Japan).

Mexico: Henry Morales, Computerworld Mexico S.A. de C.V., Oaxaca 21-2, Mexico City 7 D.F. Colonia Roma, 06700 Mexico. Phone: (05) 514-4218. Telex: 177 1300 (ACHAME).

The Netherlands: Wout Berends, CW Communications B.V., van Eggenstraat 84, 1071 GK Amsterdam, The Netherlands. Phone: (020) 64

6651. Telex: 18242 (CWCOM NL).

Norway: Mr. Morton Hansen, CW Norge A/S, Hovinveien 43, P.O. Box 2862, Toyen, 0608 Oslo 6, Norway. Phone: (20) 64 77 25. Telex: 76476 9 (CW NOR N).

People's Republic of China: Chen Mingkun, China Computerworld, 74 Lu Gu Gun Road, P.O. Box 750, Beijing 10039, People's Republic of China. Phone: (47) 814 6174. Telex: 222214 (CCW CN).

Spain: Neil Kelley, Computerworld/Espana, Barquillo 21-3 izda, Madrid-4, Spain. Phone: 231 23 85; 231 23 86; 231 23 88. Telex: 47894 (CW E).

Sweden: CW Communications AB, Sodra Hamnvagen 22, S-115 41 Stockholm, Sweden. Phone: 46 8 67 91 80. Telex: 14904 9 (NO-VACW).

Switzerland: Gebhard Osterwalder, CW Publikationen AG, Witikonstrasse no. 15, CH-8032 Zurich, Switzerland. Phone: (01) 55 10 77. Telex: 816710.

Taiwan: Grace Tang, ACE Media Agency Ltd., Room 503, 1, Fu Hsin S. Road, Sec. 1, Taipei, 10587, Taiwan, R.O.C. Phone: 751 3636. Telex: 14142 (ACE GROUP). (Representative for all CWCI publications).

United Kingdom: Martin Durham, CW Communications Ltd., 99 Grays Inn Rd., London, WC1 8UT, United Kingdom. Phone: (01) 831-9252. Telex: 262346.

Euan Rose, Bill Dunlop, Barbara Levy, Christine Taylor, Beere Hobson Assoc., 345 Goswell Rd., Islington, London EC1, United Kingdom. Phone: (01) 278 3415. Telex: 311951. (Representatives for CWCI publications).

Venezuela: Kalman von Vajna Nagy, CW Comunicaciones, C.R.L. Torre Maracabo, Piso 10, Oficina H, Av. Libertador, Caracas, Venezuela. Phone: 72-76-30.

West Germany: Eckhard Utpadel, CW Publikationen GmbH, Friedrichstrasse 31, 8000 Munchen 40, West Germany. Phone: (089) 38172-0. Telex: 5215350.

Advertisers Index

ADACOM	121
ADR	42
Advanced Systems, Inc.	106
Agile	6
ALPS	32-33
Applied Software	24
AT & T Information Systems	96-97
Avatar Technologies	54
BASF	22
BRN Computer	44
B.I. Moyle	113
Brookvale Associates	14
Cambridge Systems	78
CGI Systems	77
CIE Terminals	50-51
CMi Corp.	89
Codex Corp.	83
Compag	52-53
Computer Associates	80
Computer Corporation of America	5
Concurrent Computer Corp.	48, 69, 71-73, 75
Cullinet	110-111
CW/Circulation	120
CW/Executive Report	118
CWIMS/Corp.	112
CWIMS/Mexico	121
CW/NCC	96
Datascopy	15
Data General Corp.	46
Datagraphix	47
Datasouth	14
Dataphase	37
Digital Equipment Corporation	19
DJC	19
Donald Quirk	26
Dowling Associates	23
EASTCOM	26
Engineering Export Promotion Council of India	27
EMC	28-29
Execucom Systems	18
Fibronics	6
Fujitsu America	43
Fusion Products	90
Hewlett-Packard	84-85
High Productivity Software	23
IBM	65, 100-101
ICON Systems	38-39
Infotres	36
Integral Systems	36
Interface Technology	82
International Communications	34

Lee Data Corp.	92-93
Liberty Electronics	102
Litton Computer	12
Local Data	143
Marc Software	103
McCormack & Dodge	35
MCI Mail	94-95
Michaels, Ross & Cole Ltd.	91
Micro Focus	8
Microsoft	99
Mike Murach	9
Miltype	55
Mitrol Corp.	41
MSA	144
MTI Systems	113
MultiTech	118
NCR Corp.	24
Nemomix	107
Nete	70
On-Line Software International	122
Oracle Corp.	11, 25
Pacel Spectrum	108-109
Printonix	114
Quality Micro Systems	49
Qume	116-117
Radio Shack	76
Realia Inc.	31
SAS Institute	13, 20-21, 99
Signet Technologies	63
Software AG	104-105
Softworks	113
Sorbus Inc.	90-91
Southwest Software	47
Spectragraphics	27
Sperry	74
Stratus Computer	66
Syncoort	5, 40
Texas Instruments	123
Topaz	88
VM Software, Inc.	7
Wang Laboratories	10
Western Digital	86
Zilog	80

COMPUTER INDUSTRY

Honeywell posts earnings decline

From page 142

expect a significant change in the industry until then," he said.

Wang reported its third straight modest gain in sequential earnings and a 26% rise in profits over its weak third fiscal quarter one year ago. Wang earned \$21.4 million, or 14 cents per share, compared with year-ago net income that fell 66% from 1984 levels. Revenue grew 24% to \$685.3 million. Chairman An Wang said U.S. demand was slow, and such "difficult market conditions" will persist at least through the current quarter.

NCR, on the verge of tomorrow's realignment of its mainframe family for fault-tolerant capabilities, reported better-than-expected first-quarter profits of \$50.2 million, or 51 cents per share, up from 43 cents per share a year earlier. Sales grew 14% to \$960.7 million.

But like Honeywell and IBM, even NCR acknowledged that U.S. growth was modest. NCR attributed its earnings increase to an across-the-board increase in European product revenue, because of both unit sales and the favorable effect of currency rates.

"They also did a good job reducing losses in personal computers and even got their semiconductor business into the black," Milunovich said.

Strong European sales also boosted Lotus' net income to \$11.3 million, or 70 cents per share, up 18% from \$9.6 million, or 58 cents per share, a year earlier. Revenue jumped 55% to \$69.2 million.

"International is our fastest growing division, and we're tapping into some fairly new markets," said spokesman Bruce Rogers.

Microsoft did not disappoint investors in its first public earnings report as profits grew 25% to \$10.6 million, or 42 cents per share, and sales

climbed 24% to \$50.5 million. The Redmond, Wash., firm said it had \$1.4 million in nonrecurring expenses.

Apollo Computer, Inc. posted its second straight modestly profitable quarter after a massive loss in the third quarter of 1985, but earnings trailed well below year-earlier results. Apollo earned \$539,000, or 2 cents per share, compared with \$8.8 million, or 26 cents per share, in the first quarter of 1985. Revenue was flat at \$82 million.

Computer Consoles, Inc. (CCI) posted its fifth straight losing quarter, and Chairman and CEO John F. Cunningham said CCI would not return to the black until the third quarter. The first-quarter loss of \$5.6 million, or 47 cents per share, was about the same as in the year-earlier period. Revenue fell 18.4% to \$21.2 million.

"It's typical for a company in this type of massive transition to take 12 to 18 months to recover," said Laura Peck of L. F. Rothschild, Unterberg Towbin.

Although the semiconductor industry has shown signs of recovery, Advanced Micro Devices, Inc.'s (AMD) touted "Liberty Chip" program apparently has not helped its earnings.

The program's goal to introduce a new product every week for one year appears only to be "a lot of hype," according to Gartner Group, Inc. analyst Richard Billy. Despite a 6.5% increase in sales over the previous quarter, AMD lost \$11 million during its fourth quarter ended March 31, giving the company a \$36 million loss for the year.

On the largest gross profit margin in its history, Apple Computer, Inc. once again reported a huge earnings gain on a decline in revenue. In its second fiscal quarter, the Cupertino, Calif., micro pioneer posted profits of \$31.8 million, or 50 cents per share, compared with \$10 million, or 16 cents a share, a year earlier. Revenue dropped 6% to \$408.9 million, but gross profit margin hit 57%.

AT&T withdraws from S. Africa

From page 142

sales of computers and office communications equipment continued to be slow. He said the firm's 12% return on equity during the quarter fell short of its goal of a 20% return.

In the first quarter, AT&T's adoption of a revised Federal Accounting Standards Bureau rule for reporting pension expenses added an estimated \$100 million to the firm's profits, which totaled \$530 million, or 47 cents per share. Revenue grew 5.3% to \$8.75 billion. During the same period in 1985, AT&T earned \$354 million, or 31 cents per share, on sales of \$8.31 billion.

Robert Kavner, AT&T's senior vice-president and chief financial officer, also downplayed his company's decision. "Our presence in the computer market over there is so minuscule that I didn't even stop to consider the possible impact of the departure on our finances," he told *Computerworld*.

Five shareholding employees at AT&T Bell Laboratories had recently

sponsored the resolution urging the firm to abandon its computer-related ventures in South Africa as an anti-apartheid protest. Last week, the resolution won AT&T's formal approval.

AT&T's interest in South Africa's computer business is limited to its 25% ownership of Italian computer and office equipment vendor Ing C. Olivetti & Co., which operates a modest sales outlet in the racially splintered country. But whether the outlet has ever sold even one AT&T 3B series machine to South African users is a question that no one at last week's shareholders' meeting could answer with any confidence.

AT&T's South African holdings also include its international long-distance phone services, which the company apparently intends to preserve but will refrain from complementing with any enhanced capabilities, Brown said.

Despite the virtually unanimous industry consensus that AT&T Communications Chairman and Chief Executive Officer James E. Olson will be his replacement, Brown ducked questions about who will succeed him as chairman when he retires in August. "Our board of directors won't announce any replacement until it is ready to do so," he said.

Investors turn bearish on Telex after five strong years



ACTIVE ISSUES

Kathy Porteus

Everyone applauds a high-tech company that manages to rack up sequential quarterly earnings for nearly five years. But when Telex Corp. (TC — 59) announced several weeks ago that its March quarter would fail to continue such an earnings record, some investors stopped cheering.

Telex, the leading plug-compatible supplier of IBM 3270 terminals, lowered its March-quarter earnings guidelines by 10 to 15 cents a share because of a loss in its communications operation. Most analysts now expect the company will post fourth-quarter earnings of \$1.10 or \$1.11 a share, bringing its fiscal 1986 net income to around \$4.60 a share.

From a high of 67% in early March, Telex's stock has languished below 60 during recent weeks. Kenneth C. Leung, vice-president with Smith Barney, Harris Upham & Co., says he suspects the stock has not moved up again because investors are waiting for Telex to report its fourth-quarter and fiscal 1986 results, scheduled for April 29.

Telex is attractive at current price levels, according to Leung, who estimates the company will earn \$1.20 a share in its first quarter ending June 30 and \$5.60 a share in fiscal 1987. "Telex has prospered through a combination of timely new 3270 product introductions, low cost manufacturing and strong marketing," Leung says.

This summer, Telex plans to begin supplying IBM 5200-compatible

terminals to IBM System/36 and System/38 users, a market that complements its current 3270 business. During its 1987 fiscal year, Telex should also gain a greater presence in foreign markets, Leung says.

"Telex has strong prospects for the next couple of years," says John Rutledge, vice-president with Dillon Read & Co., who currently recommends purchase of the stock. He estimates the company's revenue and earnings in the current fiscal year, ending March 31, 1987, will climb 24% to \$885 million and \$5.70 a share. According to Rutledge, Telex is also attractive because it trades below the price/earnings ratio of the average stock. He says he believes the stock sells at a discount because IBM is a direct competitor, not because of a fundamental weakness in the company's performance.

Thomas Linkas, senior analyst with Goldman Sachs & Co., concurs that Telex has a "tremendous track record in a difficult [3270 terminal] marketplace." However, he voices concern about the company's ability to counter slowing growth in the 3270 terminal industry, of which it currently holds an approximately 15% market share.

Linkas cites recent studies by International Data Corp. of Framingham, Mass., that claim both AT&T and IBM have sharply reduced their market growth rate estimates for 3270 terminals. Unlike Rutledge, who says a slowdown in 3270 terminal demand will be serious but long-term, Linkas says his is a "six-to-12-month concern."

According to Linkas, Telex also faces the potential threat of cross-market pricing pressures if personal computer prices succumb to increased PC clone competition and decline more than the usual annual 25%. "At some point, it's got to start influencing 3270 pricing," he says.

"If you believe these concerns," Linkas adds, "then the most you can hope for from Telex this year is a 15% gain in earnings or around \$5.25 a share."

Businessland to buy 36-store retail chain; deal valued at \$75 million

SAN JOSE, Calif. — Continuing its acquisition binge, computer store giant Businessland, Inc. announced plans last week to acquire MBI, Inc., a 36-store retail chain in Rockville, Md. The acquisition, valued at \$75 million, was the second for Businessland in as many weeks.

Earlier this month, Businessland announced plans to acquire the 36-store Amerisource retail chain of Kansas City, Kan., from United Telecommunications, Inc. The mergers, if approved, will give Businessland 141 stores throughout the U.S.

The MBI acquisition teams up two of the largest computer retailing chains in the business. Formerly called the Math Box, Inc., MBI esti-

mates annual sales at \$118 million. MBI was the recipient of a \$20 million contract from the U.S. General Services Administration (GSA) to sell computers to the government at specialized computer stores. A Businessland protest on the contract award last month was recently rejected by the GSA.

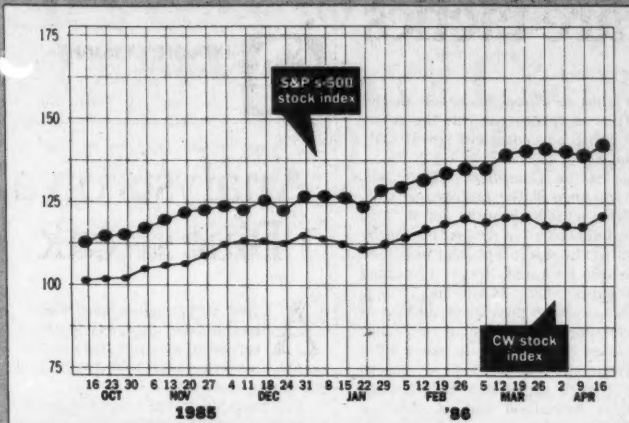
Also this month, MBI acquired 11 computer centers in the Computer South chain in North and South Carolina. Under the terms of the sale, MBI Chairman Avner Parnes will become vice-chairman of the board at Businessland, and MBI President Armen Manooogian will become a Businessland vice-president and director.

—Maura McEnaney

COMPUTER INDUSTRY

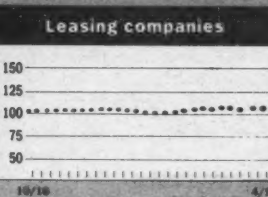
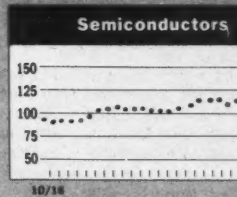
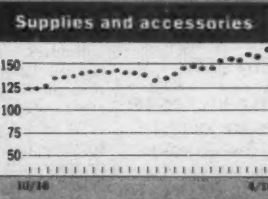
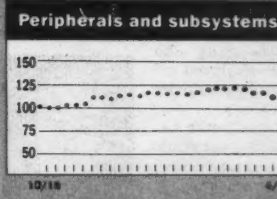
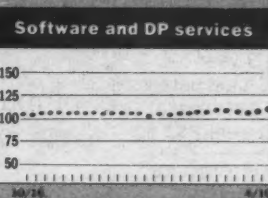
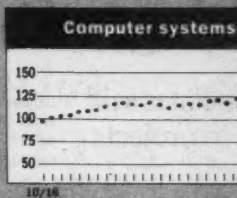
MITCHELL J. HAYES

Computerworld stock trading index



All indexes reflect a historical base of 100 on Dec. 31, 1984, and trace stock market performance in relation to that base. The CW stock index represents the unweighted average performance of the six categories of computer industry stocks.

	4/9/86	4/16/86
Computer systems	119.7	125.5
Software and DP services	105.0	105.5
Peripherals and subsystems	115.6	120.2
Supplies and accessories	154.2	155.2
Semiconductors	101.9	105.5
Leasing companies	104.0	104.6
CW stock index	116.4	120.0
Standard and Poor's 500 stock index	139.8	144.6



Computerworld stock trading summary

CLOSING PRICES WEDNESDAY, APRIL 16, 1980

X C H		PRICE			
		52-WEEK (I)	CLOSE APR 16 1986	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
O	ALPHA MICROSYSTEMS	5- 9	6 3/8	+7/8	+15.9
A	ALDS COMPUTER SYS	9-17	17 1/4	+1	+6.1
O	AMDAH CORP	10-18	18	+3/8	+2.5
N	ARC SYSTEMS CORP	10-18	31 1/2	+1	+3.2
N	APPLE COMPUTER INC	14-31	28 1/4	+1 1/8	+4.1
N	AT&T	15-28	24 1/2	+2 3/8	+10.7
N	BURROUGHS CORP	52- 71	52	+1/2	+0.4
O	COMPAQ COMPUTER CP	5- 16	15 5/8	+11/2	+7.2
O	COMPUTER AUTOMATION	1- 9	1 7/8	-1/8	-6.2
N	COMPTON MODULES	7-14	7 3/4	+1/4	+1.7
N	CONTROL DATA CORP	15-39	21 3/4	-3/8	-1.6
O	CONVERGENT TECHNOL	5-13	10 1/2	+3/4	+7.6
N	CRAY INC	52- 71	52	+1/4	+0.4
N	CRAY RESEARCH INC	25-74	72 1/4	+1 3/4	+2.4
N	DAISY SYSTEMS CORP	11-36	14	+2 1/4	+18.1
N	DATA GENERAL CORP	10-18	18	+1/4	+0.6
N	DATAPoint CORP	5-22	5 1/4	+1/4	+5.0
N	DIGITAL EQUIPMENT	85-173	173 1/4	+11 1/4	+6.3
N	ECO LOGIC INC	10-18	18	+1/4	+0.6
N	ELECTRONIC ASSOC	7-14	6 5/8	0	0.0
N	FLOATING POINT SYST	18-41	41 1/8	+1 3/4	+4.4
N	FORBOND	22-34	35 7/8	+1/4	+0.4
N	GOULD INC	20-38	26	+1 3/8	+5.5
N	HARRIS CORP	22-35	28 3/4	+1	+3.5
N	HEWLETT-PACKARD CO	42-65	64 1/2	+3/4	+0.6
N	HONEYWELL CORP	54-87	76 3/8	+5	+7.0
N	IBM	117-158	154 3/4	+51/2	+3.6
N	ICL SYSTEMS INC	2-11	4 2/8	0	0.0
N	ITT CORP	26-47	46	+1 3/8	+5.0
N	M/A-COM INC	2-13	24	+1/4	+0.4
N	MANAGEMENT ASSIST	2-28	85	+2 3/8	+2.8
N	MATSUSHITA (ELEC)OR	4-11	11	+1/4	+0.4
N	MENTOR GRAPHICS	13-30	16 5/8	+2 7/8	+20.5
N	MODULAR COMPUTER SYS	6-20	7 1/2	-1/8	-1.6
N	MORGAN DATA SCI	1-13	3	+1/4	+3.3
N	NBI INC	11-20	13 5/8	+1/4	+7.5
N	NCR	25-47	46 7/8	+3 1/4	+7.4
N	NORWEL-ELMER	2-16	32	+1/2	+1.6
N	PRIME COMPUTER INC	15-27	20	+1/2	+2.5
N	SPERRY CORP	30-59	54 3/4	+1 1/2	+2.8
N	STRATUS COMPUTER INC	22-26	26	+1/4	+0.4
N	TANDEM COMPUTERS INC	13-29	28 1/8	+3/4	+18.1
N	TANDY CORP	24-44	38 5/8	+1/4	+0.4
N	TELEVIDEO SYSTEMS	10-18	18	+1/4	+0.6
N	TELEXON CORP	10-30	29 3/4	+1 3/4	+6.1
N	TEXAS INSTRUMENTS	86-132	128 1/4	+1 7/8	+6.6
N	TRIMITE CORP	8-32	30	+1/4	+0.4
N	VECTOR GRAPHICS INC	1-11	1 1/8	0	0.0
A	WANG LABS "B"	15-29	18 1/8	-1/4	-1.1
N	WANG LABS "C"	18-29	29	+1/4	+0.4
N	VERBOS CORP	37-72	65 7/8	+1/4	+0.4

X C H		52-WEEK RANGE (1)	PRICE		WEEK NET CHANGE	WEEK PCT CHANGE
			CLOSE APR 16 1986			
	SOFTWARE & DP SERVICES					
O	ADVANCED COMP TECH	2- 5	4 5/8	+1/4	+5.7	
N	ADVANCED SYSTEMS INC	9- 20	18 5/8	+5/8	+3.4	
N	AGS COMPUTERS INC	10- 25	20 7/8	+3	+1.7	
N	AMERICAN SOFTWARE	1- 11	9 3/4	0	0.0	
N	ANACOMP INC	2- 5	4 7/8	+1/8	+2.6	
O	ANALYSTS INTL CORP.	5- 11	6 1/2	0	0.0	
N	ASTON LTD	2- 25	24 1/2	+2 3/4	+12.6	
O	ASK COMPUTER SYSTEMS	7- 25	13 1/8	0	0.0	
N	ASTRADYNE COMP AND	3- 11	3 1/4	0	0.0	
N	AUTOMATIC DATA PROC	70- 75	40 1/4	+3 3/4	+9.4	
O	COMPUTER NETWORK	5- 9	7 1/2	+1/4	+1.9	
N	COMPUTER ASSOC INT'L	18- 41	33 1/4	+5	+13.4	
N	COMPUTER HOKUS	3- 11	4	+1/4	+3.3	
N	COMPUTER SYSTEMS	13- 36	33	+1/8	+4.3	
N	COMPUTER TASK GROUP	10- 26	23 3/4	+1/4	+1.0	
N	COMPUTER USAGE	3- 11	3 7/8	0	0.0	
O	COMPTONTE SYSTEMS	3- 11	4 7/8	+1 5/8	+50.0	
N	CONSERVY CORP	1- 10	4 3/8	0	0.0	
O	CONSIGN	12- 10	12 1/2	0	0.0	
N	CULLINET SOFTWARE	12- 33	12 5/8	+3/8	+3.0	
N	CYCARE SYSTEMS INC	19- 27	27	+1/2	+1.8	
N	DATA SYSTEM INC	2- 12	8 1/4	0	0.0	
N	GENERAL ELECTRIC CO	56- 78	78	+1 7/8	+2.4	
N	GEM MOTORS & (EDS)	20- 48	47 3/4	+1 3/8	+2.9	
N	GTE CORP	38- 54	54 3/8	+2 1/4	+4.4	
N	INFORMATION SCIENCE	1- 5	3 1/8	+1/4	+7.4	
N	INFORMATION SYSTEMS CP	13- 24	15 1/2	+3/8	+2.4	
O	KEANE ASSOCIATES	1- 13	13	0	0.0	
N	LOGICON	29- 43	36 1/4	+1 1/8	+3.2	
N	LOTUS DEVELOPMENT CP	15- 34	31 1/4	+3 3/4	+13.6	
O	MCI COMMUNICATIONS	7- 13	11 1/8	+3/8	+3.4	
N	MINGET SCI	7- 16	15 1/8	+3 1/4	+21.6	
O	MATHEMATICAL APP GRP	1- 8	1 7/8	0	0.0	
N	NICOM SYSTEMS INC	12- 35	15 3/4	+3/4	+4.7	
N	NICORP	1- 13	3 1/8	+1/8	+3.1	
O	NATIONAL DATA CORP	8- 24	23 3/8	+3 1/2	+17.1	
N	ON-LINE SOFTWARE INT	11- 22	11 1/2	0	0.0	
N	PARSONS SYSTEMS	12- 32	32	+3/4	+2.3	
N	PLANNING RESEARCH	4- 13	20 7/8	+1/4	+1.2	
O	POLICY MGMT SYSTS CP	16- 35	16 1/4	-1/4	-1.7	
N	PROGRESS SYSTEMS	9- 19	19	0	0.0	
O	REYNOLDS & REYNOLD	31- 65	32	+3/8	+1.1	
O	SEI CORP	13- 27	25	+1/4	+1.0	
N	SHARED MEDICAL SYST	3- 38	38	+1 1/2	+3.9	
O	SCIENTIFIC COMPUTERS	4- 8	4 1/2	+1/4	+5.8	
O	SOFTWARE AG	12- 22	17 1/2	+3/4	+4.4	
N	TEC CORP	17- 17	17 1/4	+1/4	+1.4	
N	UCCEL	11- 19	19	0	0.0	
O	VM SOFTWARE	17- 24	22	+2 1/4	+11.3	

SEMICONDUCTORS

T C H		52-WEEK RANGE (1)	PRICE		WEEK NET CHANGE	WEEK PCT CHANGE
			CLOSE APR 16 1986			
	PERIPHERALS & SUBSYSTEMS					
P	AM INTERNATIONAL	3	8	7 1/4	+3/8	+5.4
A	ANDERSON JACOBSON	2	5	2 1/4	0	0.0
O	AST RESEARCH INC	7	33	19 1/2	-1/8	-2.4
O	AUTO TRON TECHNOLOGY	4	13	12	-1/8	-2.1
O	AVANT-GARDE COMPUTING	3	21	4 1/2	-1/2	-10.0
O	BANCTEC INC	6	12	12 3/8	+13/8	+12.5
O	BECHE INT	1	2	2	0	0.0
N	BOLT BERANEK & NEW	20	41	1 1/4	-3/4	-1.8
N	CAMLEX CORP	1	3	1	0	0.0
A	CENTRA DATA COMP	1	11	11	+1/2	+4.5
A	CETEC CORP	6	9	8 1/2	+1/4	+3.0
A	COGNITRONICS	4	3	4	+3/8	+9.0
N	COMBUSTION ENGINEERING	4	26	22 3/8	-1/8	-3.7
N	COMPUTER TRANSCIVER	0	1	1	+1/8	+14.2
N	COMPUTERPERFORMANCE	9	44	15 1/4	0	0.0
A	CONAC INC	2	12	12	+1/2	+4.2
A	DATAPRODUCTS CORP	11	20	15 1/4	-1/4	-4.9
O	DATARAM CORP	4	14	13 1/2	+5/8	+8.9
O	DATA SWAMP CORP	6	7	9	+1/4	+7.1
O	DATUM INC	5	9	5 7/8	+1/4	+4.4
O	DECISION DATA COMPUT	10	20	11 1/2	+1/4	+2.2
N	ENDATA INC	6	8	8	0	0.0
N	EVANS & SUTHERLAND	12	24	23 5/8	+3 1/2	+17.3
N	GANDALF TECHNOLOGIES	5	10	6 7/8	+1/2	+7.8
N	GEN'L DATA COMM INC	10	23	10	0	0.0
N	HAZELTINE CORP	20	30	20 3/8	+1/8	+0.6
O	ICOT CORP	3	12	10 7/8	+1/2	+4.8
O	INFORMATION INTL INC	10	17	13	+1/8	+0.9
N	INTERCOM	3	11	11	0	0.0
N	MEGADATA CORP	3	8	3 3/8	0	0.0
A	MSS DATA CORP	3	13	8 5/8	+1/2	+10.5
A	NASHUA CORP	24	47	13	+1/2	+2.0
O	NETWORK SYSTEMS CORP	11	27	16	+3 1/2	+28.0
N	NO AMERICAN PHILIPS	32	46	45 5/8	+3 3/8	+8.9
N	NORTHERN TELECOM LTD	29	41	29	+7/8	+6.3
O	OMEX	1	3	3 3/8	0	0.0
N	PRADAYNE CORP	6	18	7 5/8	-1/4	-3.1
N	PENRIL CORP	10	44	19	+1/2	+1.1
N	PLESSEY CO (ADR)	19	32	31 5/8	+3/8	+1.1
O	PRINTRIX INC	8	18	13 1/2	-3/4	-5.2
N	RACAL	11	16	14	+1/2	+4.7
N	RAMTEK CORP	2	7	7	+1/2	+14.2
N	RECOGNITION EQUIP	17	13	13	+1/8	+0.9
N	SANDERS ASSOCIATES	30	44	42	+1/2	+1.1
N	SCAN-TRON	9	22	20 1/4	+1/2	+2.5
N	SCIENTIFIC ATLANTA	10	15	10 7/8	+3/8	+3.5
N	SECURITY TECHNOLOGY	12	13	12 3/8	+1/2	+4.8
N	STORAGE TECHNOLOGY	1	5	5	+1/8	+3.3
N	STYKES DATATRONICS	0	2	2	0	0.0
N	TAB INC	8	8	8	+3/8	+4.7
N	TAB PRODUCTS CO	14	23	22 7/8	+1/4	+1.1

EXCH: N=NEW YORK; A=AMERICAN; P=PACIFIC; B=BOSTON;
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER; S=SPLIT

O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Source: Trade Quotes, Inc.

COMPUTER INDUSTRY

INSIDE

The 2-year-old NEC/Intel patent suit goes to trial next week/113

The record pace of computer mergers and acquisitions is expected to slow in 1986/114

Third-party service firms are joining together to seek hardware vendor cooperation/118

Telex Corp. slows down after five years of growth, and investors turn bearish/140

INSTANT ANALYSIS

"Sperry has a large installed base and has done a relatively poor job of leveraging it over the past few years."

— Steven Milunovich, First Boston Corp., on Sperry Corp.'s attractiveness as a takeover target

Rethinking software tactics

Computer Associates said to cut new micro projects

By Alan Alper

GARDEN CITY, N.Y. — Computer Associates, Inc., one of the first software vendors to straddle the mainframe and micro-computer markets, may be reassessing the development of new micro applications, sources close to the company say.

In recent weeks, Computer Associates has reportedly suspended the development of a relational data base management product for micros. The product, developed for the last 18 months under the name Superbase, was to have been an extension of the firm's Productivity series, which includes Supercalc and Superplan. It reportedly made use of a sophisticated multiwindowing environment and offered powerful micro-to-mainframe communications facilities.

Computer Associates founder and

Chairman Charles Wang, however, denies that the firm is retrenching in the micro arena, but refuses to comment specifically on Superbase.

In contrast to Computer Associates' strong performance in the mainframe software market, which accounts for 90% of revenue and almost all of its profits, financial results in the micro applications software business have remained disappointing. While the firm is projected to post \$188 million in revenue in the fiscal year that ended March 31, up some 30% from the previous year, micro software sales are believed to have remained flat at roughly \$20 million.

"They would have liked to have gotten out of the micro [applications] market a long time ago but would have lost face, so they continue to carry it on their books," says Scott Smith, an analyst who follows the firm for the Gartner Group, Inc.

Despite such contentions, Wang told *Computerworld* in a recent interview that

See **RETHINKING** page 121



Charles Wang

AT&T withdraws from S. Africa

By Jeffrey Boeler

SAN FRANCISCO — AT&T Chairman Charles Brown last week downplayed the significance of his company's recent decision to cease all its computer-related trade with South Africa.

Brown's comments on the market exodus came at a press conference before AT&T's 101st annual shareholders' meeting, where AT&T also announced that first-quarter profits rose 21.4%, excluding a \$100 million windfall from an accounting change.

Brown dismissed as "overblown" last week's prominent press accounts of AT&T's voluntary withdrawal from the South African computer business. "Our in-

volvement in that market is extremely tiny," he said. "We have no real investment, no sales, no customers and no people there."

AT&T also confirmed last week that it will significantly reduce its own computer purchases as part of a massive three-year corporate MIS consolidation. AT&T, the U.S.' largest computer user in terms of equipment purchases, will cut the number of its data processing centers by 50%. The company will also reportedly purchase more of its own computers.

Brown attributed the increased operating profit to strength in long-distance services and telephone sales but said that

See **AT&T** page 140



INDUSTRY INSIGHT
Clinton Wilder

Analysts on a Blue streak

After engaging in a lot of IBM-bashing during the first quarter, analysts, investors and computer market watchers are cutting Big Blue some slack.

The positive verbal and stock price responses to IBM's lackluster quarterly results were notable, considering the parade of financial types practically tripping over each other to cut their IBM earnings estimates a few weeks ago. Although the Armonk monolith failed to reach 4% growth in both earnings and revenue, even when compared with year-earlier results that actually dropped from first-quarter 1984, most leading analysts stayed bullish on IBM for the rest of 1986.

On the day the numbers were announced, IBM's stock jumped about three points in early trading, though it slipped later in the day to close slightly down. But when trading resumed Monday, April 14, Big Blue led a strong rally of technology stocks by climbing 2% to 152½ — in sight of its 52-week high of 161.

What gives? The first-quarter per-share profit of \$1.65 came in at the lower end of what E. F. Hutton & Co.'s Michael Geran called the widest range of analysts' estimates he's ever seen — and without the weaker dollar, it would have been about \$1.42 per share. IBM's hardware shipments actually declined

See **ANALYSTS** page 121

Wilder is Computerworld's senior editor, computer industry.

Honeywell earnings decline; Wang, others reveal gains

Upturn unlikely, but some firms show gains

By Clinton Wilder and Maura McEnaney

Although Honeywell, Inc. felt the effect of a sluggish U.S. computer market with a sharp drop in first-quarter earnings, healthy overseas demand and a weaker U.S. dollar lifted the fortunes of Wang Laboratories, Inc. and other firms in financial results reported last week.

While analysts saw little hope of an industrywide upturn until the second half of the year, there were several bright spots in the financial news. NCR Corp. leveraged strong European sales into a 15% earnings gain; Lotus Development Corp. achieved its first year-to-year earnings gain in three quarters; Microsoft Corp. reported a 25% growth in profits in its first quarter as a public com-

pany; and Seagate Technology, Inc., despite a drop in sales to IBM, posted record revenue and earnings.

Honeywell's overall profits fell 43.3% to \$26.2 million, or 57 cents per share, on only a 1.5% increase in revenue, to \$1.28 billion. But its Information Systems unit suffered a 90% drop in operating profits and a 17% decline in orders, said Steven Milunovich, an analyst with First Boston Corp. Milunovich said year-earlier computer profits were bolstered by a major contract to sell DPS 88 mainframes to General Electric Co.

Honeywell Chairman and Chief Executive Officer Edson Spencer said the Minneapolis firm will also show an earnings decline in the second quarter, based on continued slowness in U.S. demand. He said Honeywell will show "moderate earnings growth" for the year only if the U.S. computer market picks up in the third and fourth quarters. "We don't

See **HONEYWELL** page 140

First-quarter earnings

Company	Net Income Jan.-March, 1986 (thousands of dollars)	Percent Change From 1985	Revenue Jan.-March, 1986 (thousands of dollars)	Percent Change From 1985
Advanced Micro Devices	(11,361)	—	153,381	-23.7
Automated Data Processing	31,860	+21.9	324,259	+18.3
Computer Consoles	(5,621)	—	21,184	-18.4
DEC	170,348	+86.0	1,928,287	+14.0
Honeywell	26,200	-43.3	1,502,000	+1.5
Lotus	11,371	+18.0	69,270	+55.0
Microsoft	10,629	+25.0	50,505	+24.0
NCR	50,231	+15.0	960,774	+14.0
Pyramid Technology ¹	530	+73.2	11,095	+44.3
Seagate Technology	11,833	+598.5	126,978	+214.0
Sun Microsystems	3,386	+3.7	57,578	+37.0
Wang	21,400	+26.0	685,300	+24.0

¹ Parentheses indicates loss.

² Net income before extraordinary credit.

Information provided by individual companies.

"It's easy to choose a 3270 Protocol Converter. Start with DataLynx®/3274 And measure everything else against it."

Harriett Switzer,
Group Manager

Do the others connect SNA to an X.25 Open System?
Do they understand PC-to-Mainframe communications,
solving your total file transfer problem including high
volume binary data transfer?

Can they generate firmware within themselves, allow-
ing you to connect just about any async terminal you
want?

Do they have *System Management Mode*,
allowing async terminals to remotely monitor both
async and sync sides of your network? Can they
do address and data traces? Of any sync port?

What about their session security? Can you de-
pend on it to *really* do the job . . . day after day?

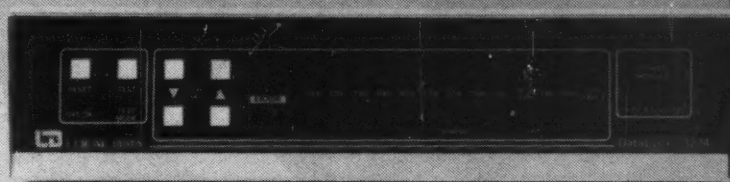
Of course DataLynx/3274 does all this and
more. It's the most powerful, dependable,
functionally rich protocol converter on
the market. It provides the best
connectivity solution for your
async-to-IBM 3270
networking problems.

Call (213) 320-7126

Canada

(613) 748-9751

UK (0753) 76537



Call Your Local Rep and Order Your DataLynx/3274. Do It Today!

COL-INS-CO (AL, FL, GA, LA, MS, NC, SC & TN)

Orlando and
Coral Springs, FL
(800) 432-4480

Tucker, GA,
Greenville, SC,
Huntsville, AL and
Raleigh, NC
(800) 327-6800

COMHART
(MD, VA, Washing-
ton D.C., & E. WV)
Edgewater, MD
(301) 261-4344

DATA NET (NJ, E. NY, CT, E. PA & DE)

Englewood, NJ
(201) 569-2353
Danbury, CT
(203) 748-4709

DATAMART
(MA, ME, NH,
RI & VT)
Wellesley, MA
(617) 235-5520

WNYCS (W. NY)
Penfield, NY
(716) 381-4120

Amherst, NY (716) 837-3280

Syracuse, NY
(315) 454-3297

APEX SYSTEMS (WI)
Menomonee Falls, WI
(414) 251-4142

**ARC ELECTRONIC
ASSOCIATES**
(IL, IN, KY, MI, OH,
W. PA & W. WV)

Westlake, OH
(800) 321-2510
Columbus, OH
(614) 863-6780

Cincinnati, OH
(513) 561-0505 or
(513) 252-3581

Ann Arbor, MI
(313) 995-1211

Pittsburgh, PA
(412) 681-8809

Indianapolis, IN
(317) 872-2877

Downers Grove, IL (312) 960-4325

**C/A
COMMUNICATIONS**
(AR, OK & TX)

Dallas, TX
(214) 634-1320

Austin, TX
(512) 452-8106

Houston, TX
(713) 974-6002

FIRST REP COMPANY
(MN, ND & SD)

Eden Prairie, MN
(612) 944-2097

**INFORMATION
PRODUCTS, INC.**
(IA, KS, MO & NE)

Independence, MO
(816) 373-9100

Omaha, NE
(402) 895-5850

St. Louis, MO
(314) 878-8743

Blue Grass, IA (319) 381-2268

DATA DEVICES
(OR, WA & ID)

Triatlin, OR
(503) 892-5115

Tukwila, WA
(206) 575-0611

**JORDAN
ELECTRONICS**
(CA, HI & NV)

Orange, CA
(714) 998-1810

San Jose, CA
(408) 298-2992

El Dorado Hills, CA
(916) 933-4435

San Diego, CA
(619) 487-8774

"Your Lynx® to IBM"

**LD LOCAL
DATA**

2771 TOLEDO STREET, TORRANCE, CA 90503 TLX 92598



WHAT POLAROID DID FOR FILM WE DID FOR INFORMATION PROCESSING.

Needing information instantly is nothing new. But getting it is.

In fact, it's more than new. It's a technological breakthrough called EXPERT QUERY™, the newest component of INFORMATION EXPERT™.

Expert Query has the ability to access live data interactively. In realtime.

And Information Expert is the fourth generation technology that allows all your existing or new software to talk to one

another. Instantly.

Call Robert Carpenter at Management Science America, Inc. 404-239-2000. He's also an expert at giving you all the information you want. Instantly.

MSA SOFTWARE
INTELLIGENCE OF A HIGHER ORDER.

